State of California
The Resources Agency
Department of Water Resources

SP-T4 Biodiversity, Vegetation Communities and Wildlife Habitat Mapping Draft Final Report

Oroville Facilities Relicensing
FERC Project No. 2100

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REPORT SUMMARY

A vegetation cover map will be included in the license application to describe the botanical resources of the project-affected area. Vegetative cover/land use and habitat data maps can help identify areas that provide important habitat for threatened, endangered, or special status plant and animal species as well as help to determine which areas are vulnerable to habitat loss, degradation, or fragmentation due to project-related operations. These maps are a necessary tool for planning and determining management options.

The study area for this report includes the FERC Project Area, a one-mile buffer around the Project Area, and the Feather River (FEMA 100-year floodplain) downstream of Oroville Dam.

A classification system of vegetation/land-use associations, based on the vegetation types used by the Holland classification system and those described in *A Manual of California Vegetation,* was developed for the study area. These associations were converted to wildlife habitats/habitat stages using the California Wildlife Habitat Relationships (WHR) system. Vegetation cover/land-use and wildlife habitat maps were produced for the study area using a combination of field investigations and heads-up digitizing from true-color aerial photography. Vegetation patterns were digitized from georeferenced aerial photography using ArcView software. Acreages of each broad-based vegetation/land-use category, vegetation/land-use associations, and WHR habitat types have been calculated for the project area, the one-mile buffer, and the Feather River floodplain downstream of the Lake Oroville.

Approximately half of the 41,000 acres within the project area is open water. The majority of vegetation around Lake Oroville consists of a variety of mixed oak woodlands, foothill pine/mixed oak woodlands, and oak/pine woodlands with a mosaic of chaparral. Vegetation around open waters of the Thermalito Complex consists of emergent wetland types with annual grasslands on the surrounding slopes. Open cottonwood riparian forests occur throughout much of the Oroville Wildlife Area, with mixed riparian and willow scrub near the Feather River.

Plants important to local Native Americans occur within the project area. Occurrence data were gathered for plant species identified by the Cultural Resource Work Group. Suitable habitat and presence/absence data for these species are included in this report. A separate report has been prepared for the Cultural Resource Work Group that contains location information for culturally important plant species.

A total of 672 plant species were identified in the project areas during the 2002/2003 surveys. Approximately 72% of these are native species and 28% are considered non-native to California. A higher percentage of non-native species occurs in project lands below the dam than around Lake Oroville.

TABLE OF CONTENTS

APPENDICES

LIST OF TABLES

LIST OF FIGURES

1.0 INTRODUCTION

1.1 BACKGROUND INFORMATION

A vegetation cover map will be included in the license application to describe the botanical resources of the project-affected area. Vegetative cover/land use and habitat data maps can help identify areas that provide important habitat for threatened, endangered, or special status plant and animal species as well as help to determine which areas are vulnerable to habitat loss, degradation, or fragmentation due to project-related operations. These maps are a necessary tool for planning and determining management options.

These vegetation cover classes have been converted to wildlife habitat classes used by the California Wildlife Habitat Relations (WHR) System. This System can also be used to evaluate wildlife species diversity within the project area.

Maintenance of biological diversity has been proposed as an alternative management strategy to the single species focus of the federal Endangered Species Act (Scott et al. 1989). The central thesis of biodiversity management is management for habitat diversity using a broad-based ecosystem approach aimed at preventing species from becoming endangered. This land-based approach seeks to insure the integrity of existing natural communities and ecosystems over time in the face of continued loss of habitat. In 1991, a Memorandum of Understanding was signed by State, federal, and local agencies related to conservation of biodiversity (MOU 1991).

1.1.1 Study Area

The study area included all areas within one mile of the FERC project boundary and downstream Feather River floodplain (within the FEMA 100-year floodplain) to the confluence with the Sacramento River.

1.2 DESCRIPTION OF FACILITIES

The Oroville Facilities were developed as part of the State Water Project (SWP), a water storage and delivery system of reservoirs, aqueducts, power plants, and pumping plants. The main purpose of the SWP is to store and distribute water to supplement the needs of urban and agricultural water users in northern California, the San Francisco Bay area, the San Joaquin Valley, and southern California. The Oroville Facilities are also operated for flood management, power generation, to improve water quality in the Delta, provide recreation, and enhance fish and wildlife.

FERC Project No. 2100 encompasses 41,100 acres and includes Oroville Dam and Reservoir, three power plants (Hyatt Pumping-Generating Plant, Thermalito Diversion Dam Power Plant, and Thermalito Pumping-Generating Plant), Thermalito Diversion

Dam, the Feather River Fish Hatchery and Fish Barrier Dam, Thermalito Power Canal, Oroville Wildlife Area (OWA), Thermalito Forebay and Forebay Dam, Thermalito Afterbay and Afterbay Dam, and transmission lines, as well as a number of recreational facilities. An overview of these facilities is provided on Figure 1.2-1. The Oroville Dam, along with two small saddle dams, impounds Lake Oroville, a 3.5-million-acre-feet (maf) capacity storage reservoir with a surface area of 15,810 acres at its normal maximum operating level.

The hydroelectric facilities have a combined licensed generating capacity of approximately 762 megawatts (MW). The Hyatt Pumping-Generating Plant is the largest of the three power plants with a capacity of 645 MW. Water from the six-unit underground power plant (three conventional generating and three pumping-generating units) is discharged through two tunnels into the Feather River just downstream of Oroville Dam. The plant has a generating and pumping flow capacity of 16,950 cfs and 5,610 cfs, respectively. Other generation facilities include the 3-MW Thermalito Diversion Dam Power Plant and the 114-MW Thermalito Pumping-Generating Plant.

Thermalito Diversion Dam, four miles downstream of the Oroville Dam creates a tail water pool for the Hyatt Pumping-Generating Plant and is used to divert water to the Thermalito Power Canal. The Thermalito Diversion Dam Power Plant is a 3-MW power plant located on the left abutment of the Diversion Dam. The power plant releases a maximum of 615 cubic feet per second (cfs) of water into the river.

The Power Canal is a 10,000-foot-long channel designed to convey generating flows of 16,900 cfs to the Thermalito Forebay and pump-back flows to the Hyatt Pumping-Generating Plant. The Thermalito Forebay is an off-stream regulating reservoir for the 114-MW Thermalito Pumping-Generating Plant. The Thermalito Pumping-Generating Plant is designed to operate in tandem with the Hyatt Pumping-Generating Plant and has generating and pump-back flow capacities of 17,400 cfs and 9,120 cfs, respectively. When in generating mode, the Thermalito Pumping-Generating Plant discharges into the Thermalito Afterbay, which is contained by a 42,000-foot-long earth-fill dam. The Afterbay is used to release water into the Feather River downstream of the Oroville Facilities, helps regulate the power system, provides storage for pump-back operations, and provides recreational opportunities. Several local irrigation districts receive water from the Afterbay.

The Feather River Fish Barrier Dam is downstream of the Thermalito Diversion Dam and immediately upstream of the Feather River Fish Hatchery. The flow over the dam maintains fish habitat in the low-flow channel of the Feather River between the dam and the Afterbay outlet, and provides attraction flow for the hatchery. The hatchery was intended to compensate for spawning grounds lost to returning salmon and steelhead trout from the construction of Oroville Dam. The hatchery can accommodate an average of 8,000 adult fish annually.

The Oroville Facilities support a wide variety of recreational opportunities. They include: boating (several types), fishing (several types), fully developed and primitive camping (including boat-in and floating sites), picnicking, swimming, horseback riding, hiking, off-road bicycle riding, wildlife watching, hunting, and visitor information sites with cultural and informational displays about the developed facilities and the natural environment. There are major recreation facilities at Loafer Creek, Bidwell Canyon, the Spillway, North and South Thermalito Forebay, and Lime Saddle. Lake Oroville has two full-service marinas, five car-top boat launch ramps, ten floating campsites, and seven dispersed floating toilets. There are also recreation facilities at the Visitor Center and the OWA.

The OWA comprises approximately 11,000-acres west of Oroville that is managed for wildlife habitat and recreational activities. It includes the Thermalito Afterbay and surrounding lands (approximately 6,000 acres) along with 5,000 acres adjoining the Feather River. The 5,000 acre area straddles 12 miles of the Feather River, which includes willow and cottonwood lined ponds, islands, and channels. Recreation areas include dispersed recreation (hunting, fishing, and bird watching), plus recreation at developed sites, including Monument Hill day use area, model airplane grounds, three boat launches on the Afterbay and two on the river, and two primitive camping areas. California Department of Fish and Game's (DFG) habitat enhancement program includes a wood duck nest-box program and dry land farming for nesting cover and improved wildlife forage. Limited gravel extraction also occurs in a number of locations.

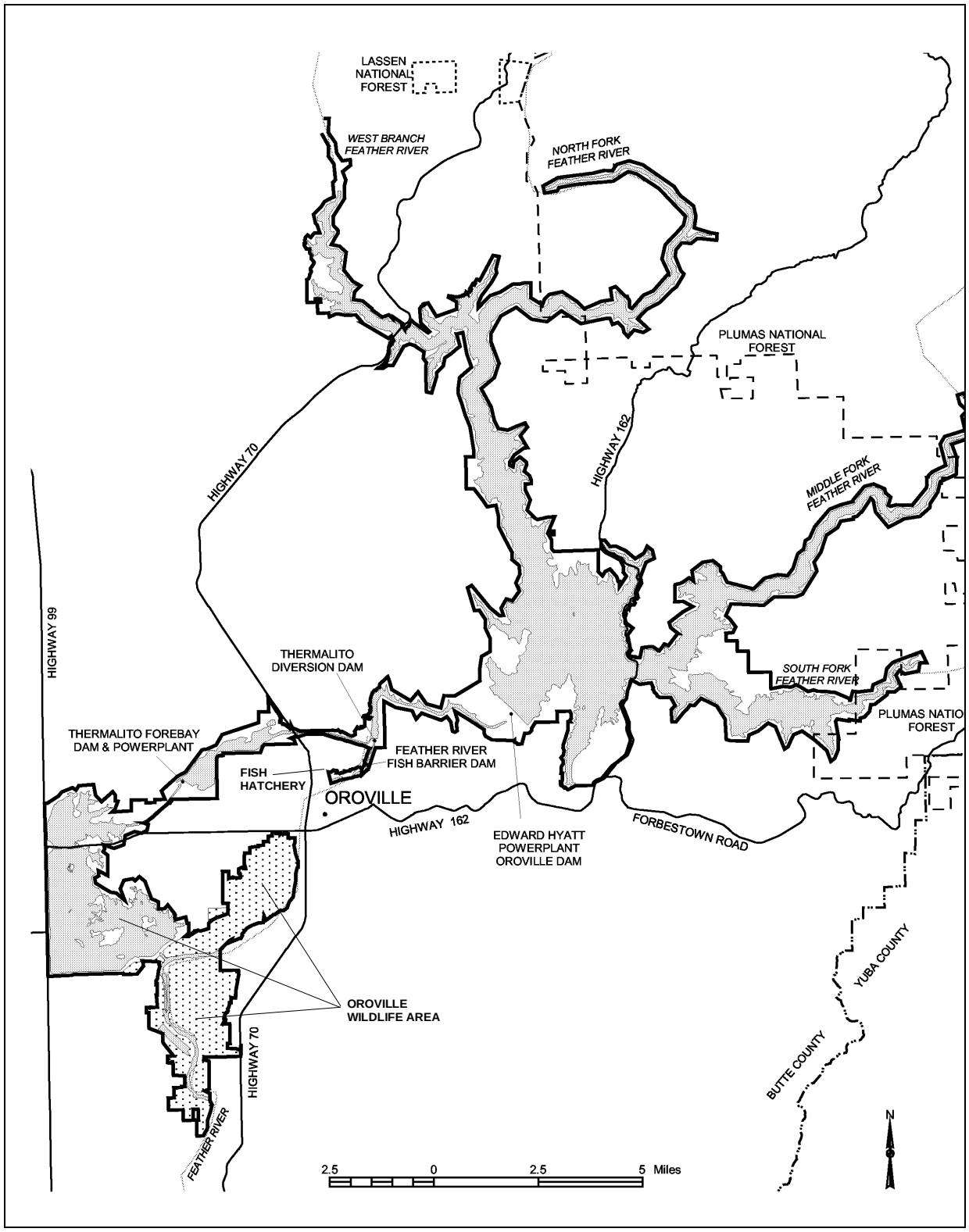


Figure 1.2-1. Oroville Facilities FERC Project Boundary

1.3 CURRENT OPERATIONAL CONSTRAINTS

Operation of the Oroville Facilities varies seasonally, weekly and hourly, depending on hydrology and the objectives DWR is trying to meet. Typically, releases to the Feather River are managed to conserve water while meeting a variety of water delivery requirements, including flow, temperature, fisheries, recreation, diversion and water quality. Lake Oroville stores winter and spring runoff for release to the Feather River as necessary for project purposes. Meeting the water supply objectives of the SWP has always been the primary consideration for determining Oroville Facilities operation (within the regulatory constraints specified for flood control, in-stream fisheries, and downstream uses). Power production is scheduled within the boundaries specified by the water operations criteria noted above. Annual operations planning is conducted for multi-year carry over. The current methodology is to retain half of the Lake Oroville storage above a specific level for subsequent years. Currently, that level has been established at 1,000,000 acre-feet (af); however, this does not limit draw down of the reservoir below that level. If hydrology is drier than expected or requirements greater than expected, additional water would be released from Lake Oroville. The operations plan is updated regularly to reflect changes in hydrology and downstream operations. Typically, Lake Oroville is filled to its maximum annual level of up to 900 feet above mean sea level (msl) in June and then can be lowered as necessary to meet downstream requirements, to its minimum level in December or January. During drier years, the lake may be drawn down more and may not fill to the desired levels the following spring. Project operations are directly constrained by downstream operational constraints and flood management criteria as described below.

1.3.1 Downstream Operation

An August 1983 agreement between DWR and DFG entitled, “Agreement Concerning the Operation of the Oroville Division of the State Water Project for Management of Fish & Wildlife,” sets criteria and objectives for flow and temperatures in the low flow channel and the reach of the Feather River between Thermalito Afterbay and Verona. This agreement: (1) establishes minimum flows between Thermalito Afterbay Outlet and Verona which vary by water year type; (2) requires flow changes under 2,500 cfs to be reduced by no more than 200 cfs during any 24-hour period, except for flood management, failures, etc.; (3) requires flow stability during the peak of the fall-run Chinook spawning season; and (4) sets an objective of suitable temperature conditions during the fall months for salmon and during the later spring/summer for shad and striped bass.

1.3.1.1 Instream Flow Requirements

The Oroville Facilities are operated to meet minimum flows in the Lower Feather River as established by the 1983 agreement (see above). The agreement specifies that Oroville Facilities release a minimum of 600 cfs into the Feather River from the

Thermalito Diversion Dam for fisheries purposes. This is the total volume of flows from the diversion dam outlet, diversion dam power plant, and the Feather River Fish Hatchery pipeline.

Generally, the instream flow requirements below Thermalito Afterbay are 1,700 cfs from October through March, and 1,000 cfs from April through September. However, if runoff for the previous April through July period is less than 1,942,000 af (i.e., the 1911-1960 mean unimpaired runoff near Oroville), the minimum flow can be reduced to 1,200 cfs from October to February, and 1,000 cfs for March. A maximum flow of 2,500 cfs is maintained from October 15 through November 30 to prevent spawning in overbank areas that might become de-watered.

1.3.1.2 Temperature Requirements

The Diversion Pool provides the water supply for the Feather River Fish Hatchery. The hatchery objectives are 52°F for September, 51°F for October and November, 55°F for December through March, 51°F for April through May 15, 55°F for last half of May, 56°F for June 1-15, 60°F for June 16 through August 15, and 58°F for August 16-31. A temperature range of plus or minus 4°F is allowed for objectives, April through November.

There are several temperature objectives for the Feather River downstream of the Afterbay Outlet. During the fall months, after September 15, the temperatures must be suitable for fall-run Chinook. From May through August, they must be suitable for shad, striped bass, and other warmwater fish.

The National Marine Fisheries Service has also established an explicit criterion for steelhead trout and spring-run Chinook salmon. Memorialized in a biological opinion on the effects of the Central Valley Project and SWP on Central Valley spring-run Chinook and steelhead as a reasonable and prudent measure; DWR is required to control water temperature at Feather River mile 61.6 (Robinson's Riffle in the low-flow channel) from June 1 through September 30. This measure requires water temperatures less than or equal to 65°F on a daily average. The requirement is not intended to preclude pump-back operations at the Oroville Facilities needed to assist the State of California with supplying energy during periods when the California ISO anticipates a Stage 2 or higher alert.

The hatchery and river water temperature objectives sometimes conflict with temperatures desired by agricultural diverters. Under existing agreements, DWR provides water for the Feather River Service Area (FRSA) contractors. The contractors claim a need for warmer water during spring and summer for rice germination and growth (i.e., 65°F from approximately April through mid May, and 59°F during the remainder of the growing season). There is no obligation for DWR to meet the rice

water temperature goals. However, to the extent practical, DWR does use its operational flexibility to accommodate the FRSA contractor's temperature goals.

1.3.1.3 Water Diversions

Monthly irrigation diversions of up to 190,000 (July 2002) af are made from the Thermalito Complex during the May through August irrigation season. Total annual entitlement of the Butte and Sutter County agricultural users is approximately 1 maf. After meeting these local demands, flows into the lower Feather River continue into the Sacramento River and into the Sacramento-San Joaquin Delta. In the northwestern portion of the Delta, water is pumped into the North Bay Aqueduct. In the south Delta, water is diverted into Clifton Court Forebay where the water is stored until it is pumped into the California Aqueduct.

1.3.1.4 Water Quality

Flows through the Delta are maintained to meet Bay-Delta water quality standards arising from DWR's water rights permits. These standards are designed to meet several water quality objectives such as salinity, Delta outflow, river flows, and export limits. The purpose of these objectives is to attain the highest water quality, which is reasonable, considering all demands being made on the Bay-Delta waters. In particular, they protect a wide range of fish and wildlife including Chinook salmon, Delta smelt, striped bass, and the habitat of estuarine-dependent species.

1.3.2 Flood Management

The Oroville Facilities are an integral component of the flood management system for the Sacramento Valley. During the wintertime, the Oroville Facilities are operated under flood control requirements specified by the U.S. Army Corps of Engineers (USACE). Under these requirements, Lake Oroville is operated to maintain up to 750,000 af of storage space to allow for the capture of significant inflows. Flood control releases are based on the release schedule in the flood control diagram or the emergency spillway release diagram prepared by the USACE, whichever requires the greater release. Decisions regarding such releases are made in consultation with the USACE.

The flood control requirements are designed for multiple use of reservoir space. During times when flood management space is not required to accomplish flood management objectives, the reservoir space can be used for storing water. From October through March, the maximum allowable storage limit (point at which specific flood release would have to be made) varies from about 2.8 to 3.2 maf to ensure adequate space in Lake Oroville to handle flood flows. The actual encroachment demarcation is based on a wetness index, computed from accumulated basin precipitation. This allows higher levels in the reservoir when the prevailing hydrology is dry while maintaining adequate flood protection. When the wetness index is high in the basin (i.e., wetness in the

watershed above Lake Oroville), the flood management space required is at its greatest amount to provide the necessary flood protection. From April through June, the maximum allowable storage limit is increased as the flooding potential decreases, which allows capture of the higher spring flows for use later in the year. During September, the maximum allowable storage decreases again to prepare for the next flood season. During flood events, actual storage may encroach into the flood reservation zone to prevent or minimize downstream flooding along the Feather River.

2.0 NEED FOR STUDY

A vegetation cover map will be included in the license application to describe the botanical resources of the project-affected area. These vegetation cover and wildlife habitat maps have been used to plan other studies related to botanical and wildlife resources and to assess a number of other issues of concern including 1) extent and acreages of plant communities and wildlife habitat (SP T1): 2) endangered or threatened species habitat (SP T2); 3) riparian and wetlands habitat (SP T3/5); 4) development of a wildlife management plan (SP T6); 5) recreation and wildlife (SP T9); 6) upland plant communities, revegetation and restoration (SP T10); and 7) fuels and fire prevention (SP T11). The maps have been used by other Work Group studies, including Land Use, Recreation, and Fisheries.

Relicensing stakeholders have identified the need to evaluate current wildlife species diversity within the project area. The wildlife habitat maps have been used to quantify the wildlife species richness necessary for assessing wildlife biodiversity.

3.0 STUDY OBJECTIVE(S)

The objectives of this study were to 1) complete plant community and wildlife habitat mapping for evaluating project related effects on biological resources and 2) provide ecological data on the existing conditions and project related effects on vegetation and wildlife resources associated with the project pursuant to the CEQA, NEPA, and FERC regulatory framework.

4.0 METHODOLOGY

Vegetative cover and wildlife habitat maps were produced for the study area using a combination of field investigations and true-color aerial photography to interpret and delineate the vegetation and wildlife habitat types.

4.1 TASK 1: AERIAL PHOTOGRAPHY PREPARATION.

Aerial photography of the project area was taken for the Department of Water Resources in 1996 and 1999. The 1996 photos of Lake Oroville were taken at a scale of 1:12000. In 1999, the project area below the dam was taken at a scale of 1:12000. In October 2001, aerial photos were taken of the Feather River from the Fish Barrier Dam to the confluence with the Sacramento River. These were taken at a scale of 1:7200. Small areas of both the one-mile buffer and the FEMA 100-year floodplain of the Feather River downstream of the Project area were not covered by the above photos. Digital Ortho-Quarter Quads (DOQQ's) and aerial photography flown for Butte County were used to fill in those gaps. Table 4.1-1 identifies each set of aerial photography used in this study, the date the photos were taken, the scale they were taken at, the resolution they were scanned at, and the resulting pixel size.

Table 4.1-1. Aerial photography used for study

Area/ Photos	Date Flown	Scale	Scanned/Pixel Size
Lake Oroville	4/25/96	1:12,000	600 dpi / 0.5m pixel size
PA below Lake	12/4/99	1:12,000	600 dpi / 0.5m pixel size
Feather River	10/31/01	1:7,200	600 dpi/ 0.3m pixel size
DOQQ's	1993/1998	1:12,000	1:40,000 scale photography georeferenced to 1:12,000 scale accuracy/1 m pixel size
Butte County	2/2002	1:24,000	/ 1.2 m pixel size

The scanned images were orthorectified using ER Mapper software. The base grid used was UTM Zone 10, NAD 83.

4.2 TASK 2: LIST OF VEGETATION TYPES THAT OCCUR WITHIN THE STUDY AREA.

A draft classification system was developed by botanical staff familiar with the project area. This initial classification system was developed using a combination of field reconnaissance, literature search, aerial photographs, California Natural Diversity Database ecology files, and a review of existing vegetation classification and maps of the project area. The classification system is based on the vegetation types used by the Holland vegetation classification system (Holland 1986) and those described in *A Manual of California Vegetation* (Sawyer and Keeler-Wolf 1995), as well as

conversations with Todd Keeler-Wolf, Resource Ecologist with the Department of Fish and Game. The initial classification scheme was modified and updated as the vegetation mapping progressed and field data were collected for this study as well as other terrestrial studies.

4.3 TASK 3: VEGETATION MAPPING AND ACCURACY ASSESSMENT.

Vegetation patterns were digitized from georeferenced aerial photography using ArcView software. The Habitat Digitizer Extension to ArcView 3.1 designed by the National Oceanic Atmospheric Administration (NOAA Website 2001) was used to delineate habitats using a hierarchical classification scheme. The project was digitized as three separate files due to the large size of the study area. These included 1) Lake Oroville, 2) the Pproject area below the dam, and 3) the downstream Feather River (FEMA 100-year floodplain) to the confluence with the Sacramento River. A one-mile buffer was mapped around the project area. Digitizing was typically performed at a scale of 1:2,000, however, larger scales up to 1:600 were used to determine some unique features. The zoom-in feature was used frequently to interpret vegetation types. A minimum mapping unit for upland vegetation types was set at 0.5 acre. Other unique cover types such as ponds, riparian and other wetland habitats were mapped as small as 0.1 acre. A small number of polygons are below the general 0.5 acre minimum (or 0.1 acre for special features). These resulted from either “special vegetation signatures” or from the clips of the project area, one- mile buffer, and Feather River floodplain that were made at the end of the mapping process. Thus a polygon may have been 0.5 acres or more when drawn (or 0.1 acre for special features), but when clipped, one or both of the resulting polygons may be less than the minimum mapping unit. Each polygon was labeled with vegetation and canopy cover type attributes and the resulting WHR category with canopy closure, size and height class, and zone information. Data collected during initial field reconnaissance were used to better prepare the persons digitizing for interpreting the vegetation patterns.

Periodic fires are a natural component of the Sierra Nevada Foothill communities. A number of fires have occurred in the study area since April 1996 (the date of the photos used for mapping the study area around Lake Oroville). Since fire can alter the type, density, or seral stage of the woodland/shrub habitats, the mapped vegetation types were revised to reflect effects of fires occurring since that date.

A copy of a GIS coverage for fire perimeters was obtained from the California Department of Forestry and Fire Protection (CDF 2003). These files were converted to UTM Zone 10 NAD 83 Meters. A new shape file was produced containing only those fires in the study area and occurring after April 1996. The 2002 Butte County aerial photos and/or field observations were used to redefine each polygon that occurred within a fire perimeter in the project area. This was only done for those polygons within the project area. Where the 2002 photos or direct observations were lacking, the

following set of general assumptions (Bishop 2003, Fites 1995, USFS Website 2003) were used to guide changes in vegetation attributes:

- Low-intensity burn situations: lower topographic position, cool/moist northerly or easterly aspect, often dense hardwood-conifer types: No change in type, density or size class. This applied to sites in the Poe, South, and Bean Creeks fire areas. Also, no changes were made where only a small fraction of a polygons showed fire effects.
- Moderate-intensity burn situations: fires have highly variable spread behaviors, including very spotty crown vs. non-crown involvement; lower or mid-lower slopes but westerly or southerly aspects, where fire results in scattered dead conifers and 20-40(50)% of the oaks are now stump-sprouting: No change in type, but reduce both density and size class by one category. This applied to all fire areas, and was the most common situation.
- High-intensity burn situations: upper slopes, ridgelines, southerly and westerly aspects connected with ridgelines or in areas receiving warm valley air masses, and areas near point of fire origin, where fire results in >50% conifers killed and 75-100% of hardwoods now stump-sprouting: Change in type to hardwood/shrub (no conifers), reduce density class by 1 or 2 categories, and reduce size class to "1" (early seral stage, sprouts). This mostly was not present in the project area, except for localized small pockets.

4.4 TASK 4: CULTURALLY IMPORTANT PLANT SPECIES.

A list of plant species important to local Native Americans that have potential for occurring in the project area was obtained from the Cultural Resources Work Group. Seventeen species or groups of plants were identified as being of particular cultural value. Information requested for these species include presence/absence, habitat, and distribution/sites within the project area, particularly those that are accessible and adjacent to roadways. General habitat/distribution information on an additional 43 species or groups of plants was requested.

Information on presence and/or significant populations of these species has been gathered during surveys for special status plant species, noxious weeds, and the riparian studies.

This information will be provided in a separate report to the Cultural Resources Work Group.

4.5 TASK 5: PLANT SPECIES LIST.

All terrestrial and aquatic plant species encountered during botanical field surveys (T2, T3/5, T4, T7, and T10) have been identified to the extent possible. Reference material used for identification of species includes *The Jepson Manual: Higher Plants of*

California (Hickman 1993), *Manual of the Vascular Plants of Butte County, California* (Oswald 1994), and *Plumas County and Plumas National Forest Flora* (Clifton 2002/2003). Nomenclature follows that of *The Jepson Manual*. Collections are housed at the California State University Chico Biological Sciences Herbarium. A list of plant species that occur within the FERC project boundary has been compiled. A separate list will be compiled for the downstream Feather River floodplain and will be included in the Final Report.

4.6 TASK 6: CALIFORNIA WILDLIFE HABITAT RELATIONSHIPS (WHR)

The classification system used by the California WHR System and Supplement (Mayer and Laudenslayer 1988) was developed to predict wildlife habitat relationships. It provides a crosswalk (Parisi 1998) used by WHR to those used in other vegetation classification systems such as those developed by Holland (1986) and Sawyer and Keeler-Wolf (1995). The vegetation communities developed for the project area under Task 3 were converted to the wildlife habitat classification system. These cover types were further classified through aerial photo interpretation and field surveys. Habitat stages are defined according to percent canopy closure and average diameter at breast height (dbh) for tree-dominated habitats. Shrub habitats are defined by percent canopy closure and crown decadence. Herbaceous habitats are defined by canopy closure and height class. Aquatic types, which include lacustrine and riverine, are characterized by the substrate and how long it is submerged (open water to shore).

Because of the large size of the study area and the complexity of vegetation, as well as access problems, the sample size used to do the initial mapping for the Lake Oroville area was taken from surveys taken only in the West Branch of the Feather River. WHR size classes for shrub and tree types for the Lake Oroville area are based on an approximately 12% field sampling of most vegetation types in the West Branch Feather River area. The dbh values, averaged over all species and transects for a vegetation type in the West Branch area, were applied to that type for the entire Lake Oroville study area. In most cases, one size class predominated and was applied to all corresponding WHR types for the mapping area above the dam. WHR cover classes were taken from field plot data and photo interpretation estimates based on ground coverage by the highest relevant canopy (i.e., the tree layer in a tree/shrub vegetation type) visible in the aerial photos.

In the project area below Lake Oroville and downstream Feather River floodplain, canopy closure and dbh values were field checked for approximately 50% of the mapped area prior to vegetation mapping. This data was taken during special status species surveys for the project area and riparian studies along the Feather River.

4.7 TASK 7: VEGETATION COVER/HABITAT TYPE ACREAGES AND LOCATION MAPS

Plant community and wildlife habitat maps have been produced. The number of acres of each plant community (including open water categories and disturbed sites) has been tabulated. Special features (such as wetlands and/or vernal maps) will be included in the Study Plan T3/5 report.

4.8 TASK 8: CALIFORNIA WILDLIFE HABITAT RELATIONS ANALYSIS

The WHR System was used to quantify wildlife species richness associated with all cover classes and size classes of all habitat types within the project area.

The wildlife habitat maps produced under Task 6 were used to determine each seral stage (WHR size and cover classes) for each habitat type, as well as

- the distribution of the habitat types and associated seral stages within the project area
- number of polygons mapped
- number of seral stages of each habitat type present within the project area

The WHR database was queried to determine the potential wildlife species occurrence in all seral stages of all habitat types present within the project area. WHR output from this analyses included the number of species of amphibians, reptiles, birds, and mammals potentially associated with each seral stage of each habitat type whether or not that seral stage was currently present within the project area or not. All WHR model runs under these analyses were Single Condition Summary Reports. WHR model inputs included

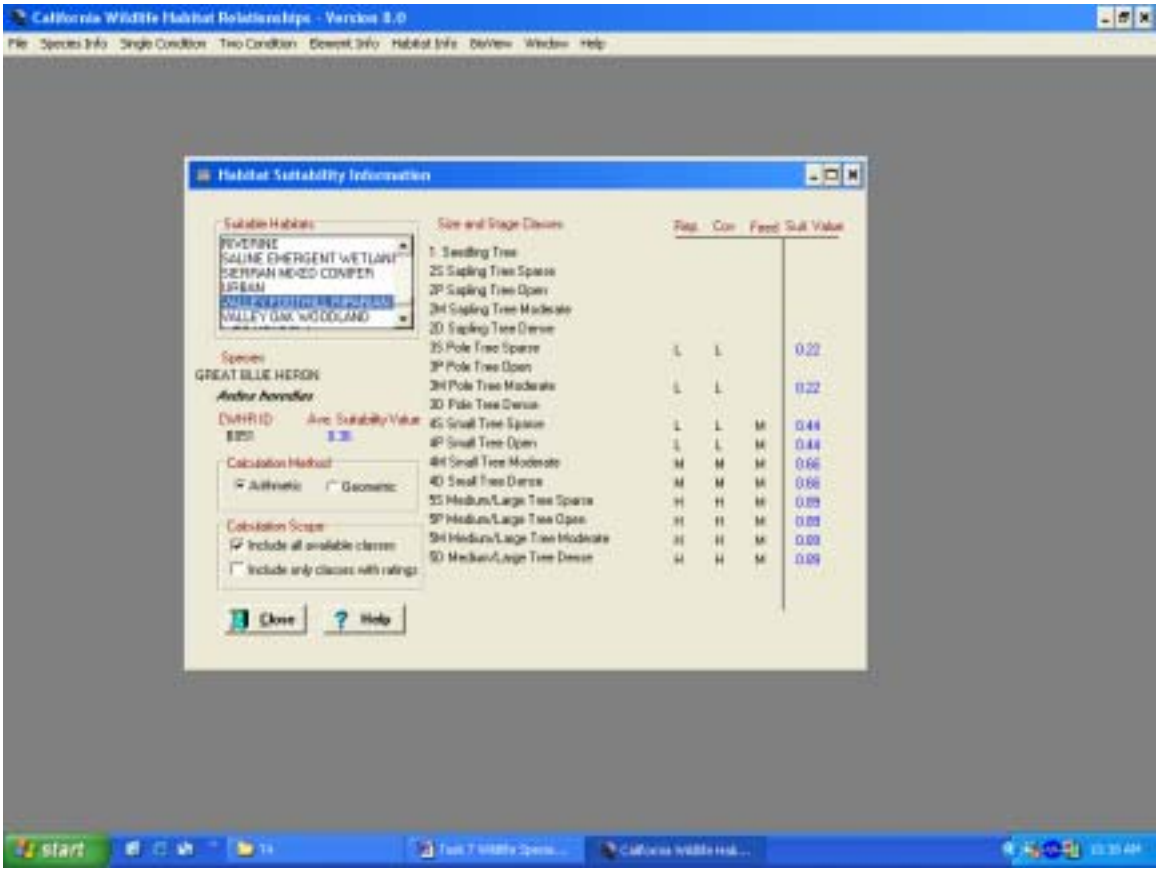
- Location-Butte County
- Habitat Type
  - Seral stage
- Habitat Elements-kelp only element excluded
- Season in Location-all seasons
- Season in Habitat-all seasons
- Species-all available in Butte County

The WHR database was also queried by species (including all species which could occur in Butte County) to quantify the average habitat suitability value of each habitat type for each species. Habitat suitability values reflect the value (zero to 1.0) of each seral stage of a habitat type for feeding, cover, and reproduction. Average habitat suitability values are the average of all the seral stages a species occurs in within a given habitat type. All WHR model runs under these analyses were Species Information Reports. An example of a model output from this analysis is presented in Figure 4.8-1. WHR model inputs include:

- Species-select each species individually

- o Habitat-select each habitat type individually
- o Data Analyses-select arithmetic mean
- o Calculation Scope-select all available classes

Figure 4.8-1. Example of a species based habitat suitability WHR output



4.9 TASK 9: ANALYSIS OF PROJECT EFFECTS.

An analysis of project effects on wildlife and native plant communities will be included in separate study reports. Projects effects on wildlife and wildlife habitat will be included in Study Reports T1 – Project operation effects on wildlife; T2 – Special status animal species; and T9 – Recreation and wildlife. Project related impacts to plants and plant communities will be addressed in Study Reports T2 – Special Status Plant Species; T3/5 – Riparian and wetland communities; T7 – Noxious plant species; and T10 – project effects on upland plant communities.

5.0 STUDY RESULTS

5.1 TASK 2: CLASSIFICATION SYSTEM

The vegetation classification system developed for the study area is presented in Table 5.1-1. A total of eight broadly defined vegetation or land-use categories were identified. These were further classified into 79 different associations. Five associations were classified as aquatic/submerged types. These included free-floating or rooted-submerged aquatic species that were easily seen on the aerial photographs. Nine of the associations were agricultural types, including one ponderosa pine plantation category. The disturbed/other category covered five associations including both natural disturbance areas such as gravel/sandbar and rock outcrops to areas where the natural vegetation is impacted by human activities (urban, gravel tailings, and disturbed). Five associations were included in the open water category, 12 in riparian forest/woodland, 8 in the riparian shrub/scrub, 22 in upland forest/woodland, 2 in upland shrub/scrub, 4 in upland herbaceous, and 7 in the wetland category. An unknown category was applied to a small number of polygons. Vegetation associations were based on a single species (i.e., Fremont cottonwood riparian forest) or two species (i.e., cottonwood/black willow riparian forest) whenever possible. These associations had one or two species dominating at least 60-70% percent of the canopy cover. Associations with “mixed” in the name or were non-species specific were vegetation types that had three or more equally dominant species in the canopy and/or ones that we were unable to discern what species were present from the aerial photography and no field data was available. A description of each association is presented in Appendix A. Most vernal pool complexes were included as part of the California annual grassland association. A vernal pool/wetland map will be included in the Study Plan T3/5 report.

Table 5.1-1. Vegetation classification system developed for the FERC Project study area

Vegetation/Land-Use Category	Vegetation Association
Aquatic/Submerged	
	Algae
	Mixed aquatic
	Mosquito fern
	Water primrose
	Water-meal
Disturbed/Agriculture	
	Eucalyptus
	Fallow field
	Hayfield
	Orchard
	Pasture
	Plantation

Vegetation/Land-Use Category	Vegetation Association
	Rice
	Row crops
	Vineyard
Disturbed/Other	
	Disturbed
	Gravel tailings
	Gravel/sandbar
	Rock outcrop
	Urban
Open Water	
	Canal
	Lake
	Pond
	Riverine
	Slough
Riparian Forest/Woodland	
	Black willow riparian forest
	Black willow/blackberry scrub
	Black willow/white alder riparian forest
	Cottonwood/black willow riparian forest
	Disturbed riparian forest
	Foothill/montane mixed riparian forest
	Fremont cottonwood riparian forest
	Mixed willow riparian forest
	Non-native riparian forest
	Valley mixed riparian forest
	Valley oak riparian forest
	Valley oak/cottonwood riparian forest
Riparian Shrub/Scrub	
	Arundo scrub
	Blackberry scrub
	Blackberry/willow scrub
	Elderberry riparian scrub
	Mixed riparian scrub
	Mixed willow scrub
	Narrowleaf willow scrub
	Non-native riparian scrub
Upland Forest/Woodland	
	Black oak woodland
	Blue oak woodland
	Blue oak woodland/chaparral
	Blue oak-foothill pine woodland
	Blue oak-foothill pine woodland/chaparral
	Canyon live oak woodland
	Douglas fir forest
	Foothill pine woodland/chaparral
	Foothill pine-mixed oak woodland
	Foothill pine-mixed oak woodland/chaparral
	Mixed conifer forest

Vegetation/Land-Use Category	Vegetation Association
	Mixed conifer-hardwood forest
	Mixed oak woodland
	Mixed oak woodland/chaparral
	Mixed pine woodland/chaparral
	Mixed pine-mixed oak woodland
	Mixed pine-mixed oak woodland/chaparral
	Ponderosa pine forest
	Ponderosa pine-Douglas fir forest
	Ponderosa pine-mixed oak woodland
	Ponderosa pine-mixed oak woodland/chaparral
	Valley oak woodland
Upland Herbaceous	
	California annual grassland
	Disturbed grassland
	Short forbland
	Tall forbland
Upland Shrub/Scrub	
	Mixed chaparral
	Whiteleaf manzanita chaparral
Wetland	
	Bulrush
	Cattail
	Mixed emergent vegetation
	Rush
	Rush/Verbena
	Seep/wet area
	Verbena

5.2 TASK 3/TASK7 – VEGETATION MAPPING / ACREAGES

Vegetation maps were produced for the project area, a one-mile buffer around the project area, and the downstream Feather River (FEMA 100-year floodplain) to the confluence with the Sacramento River (Appendix B).

The study area included approximately 173,500 acres. The total number of acres mapped for each area was 1) 41,141 within the FERC project boundary; 2) 31,878 within the Feather River FEMA 100-year floodplain; and 3) 100,537 within the one-mile buffer around the project area. The Feather River floodplain includes all of the floodplain outside the project boundary downstream of the dam. The Feather River floodplain area that occurs within the project boundary is included in the project area mapping. A portion of the Feather River floodplain acres that overlap with the one-mile buffer is included in both the one-mile buffer and Feather River floodplain totals. Vegetation mapping included canopy closure class densities. The canopy classes used

were identical to those used in California WHR classification system (Task 6) for ease of cross walking the data from the vegetation mapping to the WHR categories.

The numbers of acres that occur within each of the broad vegetation and land-use categories for each of the three mapped areas are presented in Table 5.2-1. The number of acres for each association within these categories is presented in Table 5.2-2. Vegetation totals based on canopy closure classes are not presented in this report but are available upon request.

Table 5.2-1. Acreages of general vegetation/land-use categories mapped within the study area

Vegetation/Land-Use Category	Acreage		
	Project Area	One-Mile Buffer	Feather River Floodplain
Aquatic/Submerged	443.4	33.3	89.9
Disturbed/Agriculture	126.3	10063.3	16173.9
Disturbed/Other	2327.7	11332.9	3084.0
Open Water	19796.4	766.7	3150.6
Riparian Forest/Woodland	3237.8	1042.8	4268.5
Riparian Shrub/Scrub	214.6	285.9	2175.5
Upland Forest/Woodland	11100.5	62145.0	64.3
Upland Herbaceous	2751.5	12217.9	2661.4
Upland Shrub/Scrub	231.9	2288.6	
Wetland	911.7	347.5	210.1
Unknown		13.3	
Total Acres	**41,141.8**	**100,537.2**	**31,878.1**

Table 5.2-2. Acreages of vegetation/land-use associations found within the study area

	Vegetation Type	Acreage		
		Project Area	One-Mile Buffer	Feather R Floodplain
Aquatic/Submerged				
	Algae	1.3	3.8	2.6
	Mixed aquatic	14.9	2.6	11.1
	Mosquito fern	9.3	3.9	0.2
	Water primrose	398.5	19.8	68.6
	Water-meal	19.4	3.3	7.3
Disturbed/Agriculture				
	Eucalyptus	2.6	67.5	5.0
	Fallow field	0.9	45.8	697.4
	Hayfield	3.3	443.8	346.9
	Orchard	18.2	3970.0	10484.8
	Pasture	0.7	253.1	0.0
	Plantation	0.0	601.6	
	Rice	2.1	4369.8	4414.1
	Row crops	98.3	266.6	223.5
	Vineyard	0.2	45.2	2.2
Disturbed/Other				
	Disturbed	733.6	725.8	149.0
	Gravel tailings	614.7	411.6	31.0
	Gravel/sandbar	65.0	115.2	520.6
	Rock outcrop	46.2	673.9	2.2
	Urban	868.2	9406.4	2381.2
Open Water				
	Canal	104.8	66.9	10.2
	Lake	19088.9	194.4	0.0
	Pond	319.7	190.1	274.3
	Riverine	283.1	315.2	2794.2
	Slough	0.0	0.0	71.8
Riparian Forest/Woodland				
	Black willow riparian forest	1.4	1.9	2.0
	Black willow/blackberry scrub	0.2	3.7	
	Black willow/white alder riparian forest	0.0	2.5	2.4
	Cottonwood/black willow riparian forest	117.2	31.6	92.5
	Disturbed riparian forest	0.3	4.3	1.3
	Foothill/montane mixed riparian forest	50.2	445.5	0.0
	Fremont cottonwood riparian forest	2453.8	145.1	634.8
	Mixed willow riparian forest	99.5	19.8	37.7
	Non-native riparian forest	6.7	4.5	5.4
	Valley mixed riparian forest	490.3	361.1	3198.6
	Valley oak riparian forest	18.1	22.8	114.4
	Valley oak/cottonwood riparian forest	0.0	0.0	179.4
Riparian Shrub/Scrub				
	Arundo scrub	0.0	0.0	1.2
	Blackberry scrub	6.7	41.3	51.0

	Vegetation Type	Acreage		
		Project Area	One-Mile Buffer	Feather R Floodplain
	Blackberry/willow scrub	6.0	5.7	
	Elderberry riparian scrub	5.6		
	Mixed riparian scrub	101.4	97.7	1103.2
	Mixed willow scrub	55.8	68.1	471.8
	Narrowleaf willow scrub	18.2	15.9	537.4
	Non-native riparian scrub	20.9	57.1	10.9
Upland Forest/Woodland				
	Black oak woodland	42.1	281.1	
	Blue oak woodland	472.0	3397.2	
	Blue oak woodland/chaparral	282.0	1142.0	
	Blue oak-foothill pine woodland	408.6	1122.8	
	Blue oak-foothill pine woodland/chaparral	670.2	1086.8	
	Canyon live oak woodland	587.4	1256.0	
	Douglas fir forest	169.6	2578.7	
	Foothill pine woodland/chaparral	24.8	361.6	
	Foothill pine-mixed oak woodland	981.6	3082.3	4.3
	Foothill pine-mixed oak woodland/chaparral	1425.3	4900.0	
	Mixed conifer forest	0.0	854.3	
	Mixed conifer-hardwood forest	355.0	3575.6	
	Mixed oak woodland	1468.2	5294.1	0.5
	Mixed oak woodland/chaparral	1263.7	7076.1	
	Mixed pine woodland/chaparral	7.0	305.5	
	Mixed pine-mixed oak woodland	299.2	1345.0	
	Mixed pine-mixed oak woodland/chaparral	994.6	7464.4	
	Ponderosa pine forest	3.2	592.3	
	Ponderosa pine-Douglas fir forest	112.5	2677.9	
	Ponderosa pine-mixed oak woodland	950.4	6556.5	
	Ponderosa pine-mixed oak woodland/chaparral	573.3	7043.3	
	Valley oak woodland	9.8	151.6	59.5
Upland Herbaceous				
	California annual grassland	2201.7	10664.7	141.9
	Disturbed grassland	493.4	1541.4	55.9
	Short forbland	55.2	11.9	1785.1
	Tall forbland	1.2		678.5
Upland Shrub/Scrub				
	Mixed chaparral	132.6	980.6	
	Whiteleaf manzanita chaparral	99.3	1308.0	
Wetland				
	Bulrush	0.3		
	Cattail	0.6	0.5	0.4
	Mixed emergent vegetation	286.5	166.3	209.7
	Rush	380.9	0.9	
	Rush/Verbena	200.8		
	Seep/wet area	6.6	179.7	
	Verbena	36.1		
Unknown			13.3	

5.3 TASK 6/TASK7 – CALIFORNIA HABITAT RELATIONSHIPS AND RESULTING DATA

The vegetation associations mapped under Task 3 were used to produce the WHR mapped units (Appendix C). Based on the crosswalk categories provided by Parisi (1998), the vegetation communities were converted to WHR categories. WHR habitats and habitat stages are based on the major habitat divisions (tree, shrub, herbaceous, aquatic, and developed). These divisions are further categorized into WHR habitat types and are presented in Table 5.3-1. This information was extracted from *A Guide to Wildlife Habitats of California* (Mayer and Laudenslayer 1988). The crosswalk of the WHR habitat stages for the study area is presented in Table 5.3-2.

Table 5.3-1. Available WHR habitat stages for tree, shrub, herbaceous, and aquatic habitats.

Tree dominated habitats				
Standards for Tree Size		**Standards for Canopy Closure**		
Size Class	**DBH**	**WHR Code**	**Closure Class**	**Percent Cover**
1	<1”	S	Sparse	10 – 24%
2	1” – 6”	P	Open	25 – 39%
3	6” – 11”	M	Moderate	40 – 59%
4	11”-24”	D	Dense	60 – 100%
5	>24”			
6	Size class 5 over layer of class 4 & 3 trees			
Shrub dominated habitats				
Standards for Shrub Size		**Standards for Canopy Closure**		
Size Class	**Crown Decadence**	**WHR Code**	**Closure Class**	**Percent Cover**
1	Seedlings <3 yrs	S	Sparse	10 – 24%
2	Young – no decadence	P	Open	25 – 39%
3	Mature 1 – 25% decadence	M	Moderate	40 – 59%
4	Decadent >25%	D	Dense	60 – 100%
Herbaceous Habitats				
Standards for height classes		**Standards for Canopy Closure**		
Height Class	**Plant Height**	**WHR Code**	**Closure Class**	**Percent Cover**
1	<12”	S	Sparse	2 – 9%%
2	>12”	P	Open	10 – 39%
		M	Moderate	40 - 59%
		D	Dense	60 – 100%

Aquatic Habitats				
Aquatic Zones		**Aquatic Substrates**		
Aquatic Zone	**Standard**	**Code**	**Substrate**	**Standard**
1	Open water, not closely associated with shoreline	O	Organic	Organic material
2	Submerged, substrate continually submerged	M	Mud	Wet, soft earth
3	Periodically flooded, substrate flooded from time to time	S	Sand	Coarse mineral sediment (.003-.08 inch)
4	Shore, substrate continually exposed and not occupied by vegetation	G	Gravel/Cobble	Rock fragments (.08-3.0 inch)
		R	Rubble/Boulders	Rock fragments >3.0 inch covers at least 75% of surface
		B	Bedrock	Bedrock covers at least 75% of surface

Table 5.3-2 Crosswalk between vegetation cover/associations and WHR habitat type with codes

Vegetation Cover	VegCode	WHR Type	WHR Code
Aquatic/Submerged			
Algae	ALA	Lacustrine/Riverine	LAC-2O/RIV2O
Mixed aquatic	MAA	Lacustrine/Riverine	LAC-2O/RIV2O
Mosquito fern	MFA	Lacustrine/Riverine	LAC-2O
Water-primrose	WPA	Lacustrine/Riverine	LAC-2O/RIV2O
Water-meal	WMA	Lacustrine/Riverine	LAC-2O/RIV2O
Disturbed/Agriculture			
Eucalyptus	EUC	Eucalyptus	EUC
Fallow field	FAL	Deciduous Orchard	DOR -1S
Hayfield	HAY	Irrigated Hayfield	IRH
Orchard			
Deciduous	DOR	Deciduous Orchard	DOR
Evergreen	EOR	Evergreen Orchard	EOR
Pasture	PAS	Irrigated Hayfield	IRH
Plantation	PLT	Ponderosa Pine	PPN
Rice	RIC	Rice	RIC
Row crops			
Dryland	DGR	Dryland Grain & Seed Crops	DGR
Irrigated	IRF	Irrigated Row & Field Crops	IRF
Vineyard	VIN	Vineyard	VIN
Disturbed/Other			
Disturbed	DIS	Barren	BAR

Vegetation Cover	VegCode	WHR Type	WHR Code
Gravel tailings	GRT	Barren	BAR
Gravel/sandbar	GRA	Riverine	R-3S/R3G
Rock outcrop			
Other	ROC-O	Barren	BAR
Serpentine	ROC-S	Barren	BAR-S
Volcanic	ROC-V	Barren	BAR
Urban			
Residential	URB-S	Urban	URB-S
Rural/ranch	URB-R	Urban	URB-R
Urban/disturbed	URB-U	Urban	URB-U
Open Water			
Canal	CAN	Riverine	RIV-3M
Lake	LAK	Lacustrine	LAC
Pond	PON	Lacustrine	LAC-2G,LAC-3M
Riverine	RIV	Riverine	RIV-3M
Riparian Forest/Woodland			
Black willow riparian forest	RFB	Valley Foothill Riparian	VRI
Black willow/blackberry scrub	RWB	Valley Foothill Riparian	VRI
Black willow /white alder riparian forest	RWA	Valley Foothill Riparian	VRI
Cottonwood/black willow riparian forest	RCW	Valley Foothill Riparian	VRI
Disturbed riparian forest	RFD	Valley Foothill Riparian	VRI
Foothill/montane mixed riparian forest	RFF	Valley Foothill Riparian	VRI
Fremont cottonwood riparian forest	RFC	Valley Foothill Riparian	VRI
Mixed willow riparian forest	RFW	Valley Foothill Riparian	VRI
Non-native riparian forest	RFN	Valley Foothill Riparian	VRI
Valley mixed riparian forest	RFM	Valley Foothill Riparian	VRI
Valley oak riparian forest	RFV	Valley Foothill Riparian	VRI
Riparian Shrub/Scrub			
Arundo scrub	RSA	Valley Foothill Riparian	VRI
Blackberry scrub	RSB	Valley Foothill Riparian	VRI
Blackberry/willow scrub	RSX	Valley Foothill Riparian	VRI
Elderberry riparian scrub	RSE	Valley Foothill Riparian	VRI
Mixed riparian scrub	RSM	Valley Foothill Riparian	VRI

Vegetation Cover	VegCode	WHR Type	WHR Code
Mixed willow scrub	RSW	Valley Foothill Riparian	VRI
Sandbar willow scrub	RSS	Valley Foothill Riparian	VRI
Non-native riparian scrub	RSN	Valley Foothill Riparian	VRI
Upland Forest/Woodland			
Black oak woodland	BLO	Montane Hardwood	MHW
Blue oak woodland	BOW	Blue Oak Woodland	BOW
Blue oak woodland/mixed chaparral	BOC	Blue Oak Woodland	BOW
Blue oak/foothill pine woodland	BFW	Blue Oak - Digger Pine	BOP
Blue oak-foothill pine woodland/chaparral	BFC	Blue Oak - Digger Pine	BOP
Canyon live oak woodland	CLO	Montane Hardwood	MHW
Douglas fir forest	DFF	Douglas Fir	DFR
Foothill pine woodland-chaparral	FPC	Blue Oak - Digger Pine	BOP
Foothill pine-mixed oak woodland	FPO	Blue Oak - Digger Pine	BOP
Foothill pine-mixed oak woodland-chaparral	FOC	Blue Oak - Digger Pine	BOP
Mixed conifer forest	MCF	Sierran Mixed Conifer	SMC
Mixed conifer hardwood forest	MCH	Montane Hardwood-Conifer	MHC
Mixed oak woodland	MOW	Montane Hardwood	MHW
Mixed oak woodland-chaparral	MOC	Montane Hardwood	MHW
Mixed pine-mixed oak woodland	MPO	Montane Hardwood-Conifer	MHC
Mixed pine-mixed oak woodland-chaparral	POC	Montane Hardwood-Conifer	MHC
Mixed pine woodland-chaparral	MPC	Blue Oak - Digger Pine	BOP
Ponderosa pine-douglas fir forest	PDF	Sierran Mixed Conifer	SMC
Ponderosa pine forest	PPF	Ponderosa Pine	PPN
Ponderosa pine-mixed oak woodland	PMO	Montane Hardwood-Conifer	MHC
Ponderosa pine-mixed oak woodland/chaparral	PMC	Montane Hardwood-Conifer	MHC
Valley oak woodland	VOW	Valley Oak Woodland	VOW
Upland Herbaceous			
California annual grassland	AGS	Annual Grassland	AGS
Disturbed grassland	DGS	Annual Grassland	AGS
Short forbland	SFB	Annual Grassland	AGS
Tall forbland	TFB	Annual Grassland	AGS
Upland Shrub/Scrub			
Mixed chaparral	MXC	Mixed Chaparral	MCH
Whiteleaf manzanita chaparral	MAN	Mixed Chaparral	MCH

Vegetation Cover		VegCode	WHR Type	WHR Code
Wetland				
	Bulrush	BEW	Freshwater Emergent Wetland	FEW
	Bulrush/cattail	BCW	Freshwater Emergent Wetland	FEW
	Cattail	CEW	Freshwater Emergent Wetland	FEW
	Mixed emergent vegetation	MXE	Freshwater Emergent Wetland	FEW
	Rush	REW	Freshwater Emergent Wetland	FEW
	Rush/verbena	RVW	Freshwater Emergent Wetland	FEW
	Seep/wet area	WET	Freshwater Emergent Wetland	FEW
	Verbena	VEW	Freshwater Emergent Wetland	FEW

The number of acres that occur within each of the habitat stage for the Project Area, one-mile buffer and downstream Feather River floodplain is presented in Table 5.3-3.

Table 5.3-3. Acreages of WHR habitat types found within the study area.

	Habitat Type/WHR	Habitat Stage	Acreage			WHR Code
			Project Area	One-Mile Buffer	Feather R Floodplain	
Agriculture						
	Dryland Grain and Seed Crops - DGR		98.3	6.6		DGR
	Deciduous Orchard - DOR	1S	0.9	263.9	700.4	DOR-1S
		2D		914.3	288.2	DOR-2D
		2M	7.7	223.2	502.5	DOR-2M
		2P	0.2	953.4	1128.9	DOR-2P
		2S	1.8	370.3	2075.7	DOR-2S
		3D		838.8	1740.1	DOR-3D
		3M	0.4	62.3	1161.2	DOR-3M
		3P	0.0	22.1	117.1	DOR-3P
		3S			11.4	DOR-3S
		4D			2980.0	DOR-4D
		4M			274.8	DOR-4M
		4P			28.1	DOR-4P
		4S			3.8	DOR-4S
		5D			83.5	DOR-5D
		5M			66.8	DOR-5M

	Habitat Type/WHR	Habitat Stage	Acreage			WHR Code
			Project Area	One-Mile Buffer	Feather R Floodplain	
	Evergreen Orchard - EOR	1S		3.3		EOR-1S
		2D	0.4			EOR-2D
		2M		131.2		EOR-2M
		2P	4.4	38.0		EOR-2P
		2S		59.2		EOR-2S
		3D	3.2	53.7	5.8	EOR-3D
		3M		69.1	14.0	EOR-3M
		3P		7.4		EOR-3P
		3S		5.6		EOR-3S
	Eucalyptus - EUC	2D		4.0		EUC-2P
		2P	0.0	1.1		EUC-2P
		3D		48.5	5.0	EUC-3D
		3M	0.5	1.6		EUC-3M
		3P		2.3		EUC-3P
		3S	0.6			EUC-3S
		4D	1.6	6.8		EUC-4D
		4M		3.0		EUC-4M
	Irrigated Hayfield - IRH		3.3	443.8	346.9	IRH
	Irrigated Row and Field Crops - IRF			260.0	223.5	IRF
	Pasture - PAS			253.1	0.0	IRH
	Rice - RIC		2.1	4369.8	4414.1	RIC
	Vineyard - VIN		0.2	45.2	2.2	VIN
Aquatic Types						
	Lacustrine - LAC	1G	0.8	131.4		LAC-1G
		1M	3681.8	13.5		LAC-1M
		1R	15145.5	49.6		LAC-1R
		2G	296.4	108.4	87.4	LAC-2G
		2O	443.4	33.3	24.3	LAC-2O
		2R	260.8			LAC-2R
		3M	23.3	81.7	187.0	LAC-3M
	Riverine - RIV	1G			182.5	RIV-1G
		1R	283.1	315.2	592.6	RIV-1R
		1S			2010.9	RIV-1S
		2B	1.3	11.0		RIV-2B
		2M			8.3	RIV-2M
		2O			65.6	RIV-2O
		3B	15.7	0.1		RIV-3B

	Habitat Type/WHR	Habitat Stage	Acreage			WHR Code
			Project Area	One-Mile Buffer	Feather R Floodplain	
		3G	65.0	115.2	103.1	RIV-3G
		3M	87.8	55.8	82.0	RIV-3M
		3S			417.4	RIV-3S
Disturbed						
	Urban - URB	URB-R	52.7	1921.1	60.7	URB-R
		URB-S	32.8	3977.1	46.6	URB-S
		URB-U	782.7	3508.2	2273.8	URB-U
	Barren - BAR		1394.4	1811.3	182.2	BAR
Herbaceous Habitat						
	Annual Grassland - AGS	1D	17.8	4.4	1391.7	AGS-1D
		1M	41.8	31.7	375.6	AGS-1M
		1P	4.2	9.5	17.8	AGS-1P
		2D	2257.1	10644.4	208.0	AGS-2D
		2M	284.0	1459.8	644.7	AGS-2M
		2P	146.6	68.1	23.5	AGS-2P
	Freshwater Emergent Wetland - FEW	1M		0.5		FEW-1M
		2D	468.2	232.9	170.3	FEW-2D
		2M	420.6	97.3	35.5	FEW-2M
		2P	22.8	16.8	4.3	FEW-2P
Shrub Habitat						
	Mixed chaparral - MCH	1P	2.1			MCH-1P
		1S	1.3			MCH-1S
		2D	6.6			MCH-2D
		2M	2.6			MCH-2M
		2S	1.7	0.6		MCH-2S
		3D	141.3	1801.2		MCH-3D
		3M	27.3	192.1		MCH-3M
		3P	31.6	97.3		MCH-3P
		3S	20.0	194.6		MCH-3S
Tree Habitat						
	Blue Oak-Digger Pine - BOP	2D	2.6			BOP-2D
		2M	67.5			BOP-2M
		2P	10.8			BOP-2P
		2S	0.4			BOP-2S
		3D	2174.4	4928.0		BOP-3D
		3M	912.2	3970.3		BOP-3M
		3P	290.9	1412.4	1.1	BOP-3P
		3S	43.0	377.2	1.0	BOP-3S

	Habitat Type/WHR	Habitat Stage	Acreage			WHR Code
			Project Area	One-Mile Buffer	Feather R Floodplain	
		4D	1.9	74.0	0.8	BOP-4D
		4M	4.3	71.7	1.4	BOP-4M
		4P	0.9	4.9		BOP-4P
		4S	10.1	20.4		BOP-4S
	Blue Oak Woodland - BOW	2P	2.7			BOW-2P
		2S	10.2			BOW-2S
		3D	50.6	33.7		BOW-3D
		3M	157.0	352.9		BOW-3M
		3P	57.6	400.5		BOW-3P
		3S	31.7	417.8		BOW-3S
		4D	99.3	282.8	0.5	BOW-4D
		4M	212.1	1926.9		BOW-4M
		4P	141.5	1056.2		BOW-4P
		4S	30.7	192.9		BOW-4S
		5P		4.5		BOW-5P
		5S		5.0		BOW-5S
	Douglas Fir - DFR	4D	169.6	2578.7		DFR-4D
	Montane Hardwood-Conifer - MHC	2M	47.1			MHC-2M
		2P	4.1			MHC-2P
		2S	2.8			MHC-2S
		3D	20.4	4342.3		MHC-3D
		3M	447.2	6014.1		MHC-3M
		3P	42.3	658.4		MHC-3P
		3S		92.4		MHC-3S
		4D	1672.9	9512.7		MHC-4D
		6D	432.6	1601.6		MHC-6D
		6M	217.8	1440.6		MHC-6M
		6P	279.9	2036.0		MHC-6P
		6S	12.7	286.6		MHC-6S
	Montane Hardwood - MHW	1P	4.3			MHW-1P
		1S	6.2			MHW-1S
		2D	2.5			MHW-2D
		2M	115.2			MHW-2M

	Habitat Type/WHR	Habitat Stage	Acreage			WHR Code
			Project Area	One-Mile Buffer	Feather R Floodplain	
		2P	26.3			MHW-2P
		2S	32.9			MHW-2S
		3D	2363.6	7594.7		MHW-3D
		3M	581.5	4157.7		MHW-3M
		3P	159.5	1641.0		MHW-3P
		3S	17.5	382.7		MHW-3S
		4P	1.1			
	Montane Riparian - MRI	1D	0.1	4.0		MRI-1D
		1M	1.4	11.3		MRI-1M
		1P	2.7	9.8		MRI-1P
		3D	13.0	371.8		MRI-3D
		3M	11.2	53.7		MRI-3M
		3P	26.0	20.0		MRI-3P
	Ponderosa Pine - PPN	2M		601.6		
		4D	3.2	563.6		PPN-4D
		4M		28.7		
	Sierran Mixed Conifer - SMC	4D	111.0	3439.4		SMC-4D
		4M	1.5	46.1		SMC-4M
		4P		46.7		
	Valley Oak Woodland - VOW	2S	4.1			VOW-2S
		3M		1.3		VOW-3M
		3P			12.2	VOW-3P
		4D		2.5	14.6	VOW-4D
		4M		7.1	3.9	VOW-4M
		4P	3.6	7.3	13.4	VOW-4P
		4S		35.0		VOW-4S
		5D		79.1	10.0	VOW-5D
		5P	2.2	19.3		VOW-5P
		5S			5.4	VOW-5S
	Valley Foothill Riparian - VRI	1D	11.5	40.4	31.1	VRI-1D
		1M	2.8	14.4	19.9	VRI-1M

	Habitat Type/WHR	Habitat Stage	Acreage			WHR Code
			Project Area	One-Mile Buffer	Feather R Floodplain	
		1P	0.2	5.6		VRI-1P
		2D	17.9	45.9	418.5	VRI-2D
		2M	93.7	74.9	475.2	VRI-2M
		2P	249.0	36.0	565.8	VRI-2P
		2S	126.6	81.5	395.9	VRI-2S
		3D	51.6	87.7	277.6	VRI-3D
		3M	154.6	93.9	211.9	VRI-3M
		3P	222.8	56.6	267.4	VRI-3P
		3S	155.0	21.5	419.8	VRI-3S
		4D	864.4	121.3	1740.1	VRI-4D
		4M	788.9	160.9	718.7	VRI-4M
		4P	579.4	12.7	232.8	VRI-4P
		4S	79.6	4.8	78.2	VRI-4S
		5D			436.9	VRI-5D
		5M			70.3	VRI-5M
		5P			1.6	VRI-5P
		6D			82.4	VRI-6D
	Unknown			13.3		

5.4 TASK 4 – CULTURALLY IMPORTANT PLANT SPECIES

Table 5.4-1 contains those plant species that are important to local Native Americans. Information includes presence/absence within the project area and types of habitat in which it would be likely to be found. A separate report has been compiled with site specific data. This report is confidential and will be provided to the Cultural Resource Work Group.

Table 5.4-1. Culturally important plant species and habitat

Common Name *Latin Name*	**Amounts Worth Special Notation**	**Observed in Project Area? X=yes O=no ***	**Notes/ Comments**	**-POTENTIAL- Suitable Habitat (Veg Association used in mapping)**
Black Oak *Quercus kelloggii*	Trees adjacent to roadways	X		Black oak woodland, Mixed conifer-hardwood forest, Pond. Pine-mixed oak woodland
Brodiaeas *Brodiaea* spp.	Concentra-tions of several dozen	X	Spp observed: *B. californica* *B. coronaria* var. *coronaria* *B. elegans* *B. minor*	Annual grassland, Open Blue oak woodland, Mixed oak woodland, open oak woodlands with chaparral and/or foothill pine, Rock outcrop
Dichelostemma spp.	Concentra-tions of several dozen	X	Spp observed: *D. capitatum* *D. multiflorum* *D. volubile*	Annual grassland, Open Blue oak woodland, Mixed oak woodland, open oak woodlands with chaparral and/or foothill pine
Lilies *Lilium* spp.	Concentra-tions of several dozen	X	Only *L. humboldtii* observed; CNPS List 4 species	Mixed conifer forest, Mixed conifer-hardwood forest, pine-oak woodland openings, other brushy slopes in forest
Lomatium spp.	Concentra-tions of several dozen	X	Spp. observed: *L. dasycarpum* spp. *tomentos.* *L. marginatum* *L. utriculatum*	Annual grassland, Open Blue oak woodland, Mixed oak woodland
Wild onions *Allium* spp.	Concentra-tions of several dozen	X	Spp. observed: *A. amplectens* *A. peninsulare*	Annual grassland, Open Blue oak woodland, Mixed oak woodland, open oak woodlands with chaparral and/or foothill pine, Rock outcrop

Common Name *Latin Name*	**Amounts Worth Special Notation**	**Observed in Project Area? X=yes O=no ***	**Notes/ Comments**	**-POTENTIAL- Suitable Habitat (Veg Association used in mapping)**
Yampah *Perideridia* spp.	Concentra-tions of several dozen	X	*P. bolanderi* = dry habitats *P. kellogii, lemmonii* = wet	Blue oak woodland (open), Foothill/montane riparian forest
Elderberry *Sambucus mexicana*	Concentra-tions of 5+ shrubs	X		Elderberry riparian scrub, Mixed riparian scrub, all riparian forest types exc. in lake drawdown area
Five-finger fern *Adiantum pedatum* var. *aleuticum*	Concentra-tions of 5+ shrubs	X	(=*A. aleuticum*) Related spp only observed: *A. jordanii, A. capillus-veneris*	Streamside Foothill/ montane riparian forest, Dense Mixed oak woodland, Mixed conifer-hardwood forest, Ponderosa pine- mixed oak forest
Western bracken *Pteridium aquilinum*	Concentra-tions of 5+ shrubs	X		Mixed conifer forest, Mixed conifer-hardwood forest, all types with Ponderosa pine (but not those with chaparral or foothill pine)
California hazelnut *Corylus cornuta*	Concentrati ons of 5+ shrubs	O		Dense Mixed conifer forest, Mixed conifer-hardwood forest moist slopes, Foothill/ montane mixed riparian forest, Ponderosa pine mixed oak forest
California blackberry *Rubus ursinus*	Concentra-tions near roads	X		Blackberry scrub (all types), riparian forest (all types)
Milkweeds *Asclepias* spp.	Concentra-tions near roads	X	*A. cordifolia* = dry habitats *A. fascicularis* = streambeds	Rock outcrop, all non-Ponderosa types with chaparral; all open riparian types (dried stream beds)
Blackcap raspberry *Rubus leucodermis*	Concentra-tions near roads	O	*R. glaucifolius* found in Middle Fork, but not near roads	Ponderosa pine forest types, Mixed Conifer Forest
Thimbleberry *Rubus parviflorus*	Concentra-tions near roads	O		Ponderosa pine forest types, Mixed Conifer Forest
Redbud *Cercis occidentalis*	3+ shrubs near roads	X		Foothill/montane riparian forest, Mixed oak woodland, Mixed chaparral, all woodland types with chaparral

Common Name *Latin Name*	**Amounts Worth Special Notation**	**Observed in Project Area? X=yes O=no ***	**Notes/ Comments**	**-POTENTIAL- Suitable Habitat (Veg Association used in mapping)**
Sedges *Carex* spp. (particularly *C.barbarae*)	¼-acre or more	X	Many spp observed (see text for list)	Riparian forest (all types), Seep/wet area, Mixed emergent veg, Pond
Balsamroot *Balsamorhiza deltoidea*	-	X		Openings in Mixed pine-mixed oak-mixed chaparral, Ponderosa pine forested types
Bear-grass *Xerophyllum tenax*	-	O		Mixed Conifer Forest
Bitter cherry *Prunus emarginata*	-	O		Mixed Conifer Forest
Blue wild rye grass *Elymus glaucus*	-	X		Grassy openings in many wooded habitats
Blue/Deerbrush/ Buckbrush *Ceanothus* spp.	-	X	*C. cuneatus* the only sp observed besides *C. integerrimus*	Blue oak woodland with chaparral understory, with and without foothill pine
Bluegrass *Poa* sp.	-	X	*P. tenerrima* only native sp observed; *P. secunda* possible	Thin-soiled rocky areas in open oak woodland types, Annual grassland, chaparral
Bromes *Bromus* spp.	-	X	Native spp observed: *B. carinatus, B. laevipes*	All grasslands and grassy openings in all habitats
Bush chinquapin *Castanopsis sempervirens*	-	O	now *Chrysolepis sermpervirens*	Mixed Conifer Forest
Buttercup *Ranunculus* sp.	-	X	Native terrestrial spp observed: *R. bonariensis* var. *trisepalus, R. occidentalis, R.* sp. (unid.)	Mixed oak woodland types with grassy understory
California (Bay) laurel *Umbellularia californica*	-	X		Foothill/montane riparian forest, moist oak/chaparral types
California buckeye *Aesculus californica*	-	X		Mixed pine, mixed oak, mixed chaparral types
California rose *Rosa californica*	-	X		Riparian types
Calochortus spp.	-	X	Spp. observed: *C. albus* *C. luteus* *C. monophyllus* *C. superbus* *C. tolmei*	California annual grassland, larger grassy openings in Blue oak and mixed oak woodlands

Common Name *Latin Name*	**Amounts Worth Special Notation**	**Observed in Project Area? X=yes O=no ***	**Notes/ Comments**	**-POTENTIAL- Suitable Habitat (Veg Association used in mapping)**
Choke-cherry *Prunus virginiana* var. *demissa*	-	O		Moist, brushy, rocky ravines in Foothill/montane riparian forest, Mixed Conifer forest, Ponderosa pine forest types, incl. with chaparral
Clarkias *Clarkia* spp.	-	X	Spp. observed: *C.biloba* ssp. *brandegeae, ** *C. concinna, C. gracilis* ssp. *albicaulis*, C. purpurea, C. mosquinii*, C. rhomboidea, C. unguiculata* *CNPS List 1B	Grassy slopes, thinly vegetated rocky slopes, openings, in many wooded types
Currant/Gooseberry *Ribes* sp.	-	X	*R. nevadense* the only sp seen.	Mixed conifer forest, Mixed conifer-hardwood forest
Deer brush *Ceanothus integerrimus*	-	X		Mixed conifer forest, Mixed conifer-hardwood forest
Fawn-lilies *Erythronium* spp.	-	X	*E. multi-scapoideum* the only sp seen.	Mixed conifer forest, Mixed conifer-hardwood forest with chaparral elements, Mixed oak woodlands
Foothill pine *Pinus sabiniana*	-	X		Overstory in Blue oak, Mixed oak, Mixed pine woodland types
Fritilaries *Fritillaria* spp.	-	X	All plants seen in Project Area are or have potential to be *F. east-woodiae*, a CNPS List 3 species.	Openings in Mixed conifer forest, Mixed conifer-hardwood forest with chaparral elements, Mixed oak woodlands, usually with some Mixed chaparral
Indian plum/ Oso-berry *Oemleria cerasiformis*	-	O	Was *Osmaronia cerasiformis*	Brushy slopes, ravines in Mixed oak woodland with chaparral
Madrone *Arbutus menziesii*	-	X		Mixed conifer-hardwood forest, Ponderosa pine-mixed oak forest
Manzanita *Arctostaphylos* spp.	-	X	Whiteleaf manz. (*A. viscida*) the only sp. seen	Manzanita scrub, Mixed chaparral

Common Name *Latin Name*	**Amounts Worth Special Notation**	**Observed in Project Area? X=yes O=no ***	**Notes/ Comments**	**-POTENTIAL- Suitable Habitat (Veg Association used in mapping)**
Narrowleaf mule's ears *Wyethia angustifolia*	-	X		Open pine-oak-shrub woodlands
Narrowleaf/ Sandbar willow *Salix exigua*	-	X	*S. hindsiana* now included in this sp.	Narrowleaf willow riparian scrub
Oaks *Quercus* spp.	-	X	Spp. observed: *Q.berberidifolia* *Q. chrysolepsis* *Q.douglasii* *Q. kelloggii* *Q. lobata* *Q. wislizenii*	Blue oak, mixed oak, black oak, and mixed pine-oak woodlands, Mixed conifer-hardwood forest; some mixed chaparral for *Q. berberidifolia,* and *Q. wislizenii*
Odontostomum spp.	-	X	*O. hartwegii* the only sp. seen	Annual grassland, Open grassy areas in blue oak-foothll pine woodlands with chaparral component
Popcorn flowers *Plagiobothrys* spp.	-	X	Spp. observed: *P. austinae* *P. bracteatus* *P.fulvus* *P. greenei* *P. stipitatus* var. *micranthus*	Annual grassland (incl vernal pools), grassy areas in blue oak woodlands
Redmaids *Calandrinia ciliata*	-	X		Orchards, fields, disturbed grassy areas in woodland types
Service-berry *Amelanchier utahensis*	-	O		Ponderosa pine and mixed conifer forest types
Sierra plum *Prunus subcordata*	-	O		Mixed oak woodland and chaparral adjacent to mixed conifer forest
Soap plants *Chlorogalum* spp.	-	X	Spp. observed: *C. angusti-folium,* *C. pomerid-ianum*	Annual grassland, Open grassy areas in blue oak-foothll pine woodlands with chaparral component, riparian edges, Mixed chaparral
Sugar pine *Pinus lambertiana*	-	O		Mixed conifer forest
Tan-oak *Lithocarpus densiflora*	-	X		Mixed conifer forest, mixed conifer-hardwood forest
Tarweed *Madia* sp.	-	X	Spp. observed: *M. elegans* *M. gracilis* *M. madioides*	Annual grassland, sunny openings in many wooded types and grassy areas in chaparral

Common Name *Latin Name*	**Amounts Worth Special Notation**	**Observed in Project Area? X=yes O=no ***	**Notes/ Comments**	**-POTENTIAL- Suitable Habitat (Veg Association used in mapping)**
Tidytips *Layia* spp.	-	X	*L. fremontii* only sp seen	Annual grassland in valley floor
Toyon *Heteromeles arbutifolia*	-	X		Mixed chaparral, mixed oak woodland and other woodland types with chaparral, Foothill/ montane riparian woodland
Triteleia spp.	-	X	Spp. observed: *T. bridgesii* *T. hyacinthine* *T. ixioides* *T. laxa*	Annual grassland, open blue oak woodland, mixed oak woodland, open oak woodlands with chaparral and/or foothill pine
White-flowered hastingia *Hastingsia alba*	-	O	Was *Shoenolirion album*	Seeps, springs, meadows in lower mixed conifer forest, mixed conifer-hardwood forest
Wild grape *Vitis californica*	-	X		Foothill/montane riparian forest, Valley mixed riparian forest, other riparian forest types
Wild strawberry *Fragaria vesca*	-	O		Cool, moist slopes in moderately open mixed conifer forest, other types with ponderosa pine
Wood rose *Rosa gymnocarpa*	-	O		Ponderosa pine forest types; mixed conifer forest
Wormwood (Mugwort) *Artemisia douglasiana*	-	X		All riparian types, springs/seeps in forested areas

Note * Many of the species not observed are those of elevations higher than found within the Project Area.

5.5 TASK 5 - PLANT SPECIES LIST

A total of 672 plant species were identified in the project area during the 2002/2003 surveys (Appendix D). Four hundred and eighty-five (72%) of these are native species and 187 are considered non-native to California. Plant species lists were compiled separately for the project area around Lake Oroville (above the dam) and the area within the project area below the dam (includes areas along the Feather River, Diversion Pool, Thermalito Complex, and Oroville Wildlife Area). Table 5.5-1 lists the number of native and non-native plant species for both areas as well the number of species that occur only above the dam, below the dam, and in both areas.

Approximately 25% of the plant species identified around Lake Oroville were non-native species. Thirty-six percent of species below the dam are not native to this area.

Table 5.5-1. Number of plant species identified in the project area during the 2002/2003 surveys

	Number of spp.	Lake Oroville Area	Below Lake Oroville	Both	Total Lake Oroville	Total Below dam
Native	487 (72%)	187	160	140	327 (75.2%)	300 (64.4%)
Non-native	190 (28%)	24	82	84	108 (24.8%)	166 (35.6%)
Total taxa	677	211	242	224	435	466

5.6 TASK 8 – CALIFORNIA WILDLIFE HABITAT RELATIONS ANALYSIS

Analysis by Habitat

Table 5.6-1 summarizes the wildlife habitat and species biodiversity within the project area. A detailed assessment of wildlife species richness by seral stage and habitat type is presented in Appendix E.

Table 5.6-1. Summary of Wildlife Habitat and Species Diversity within the Project Area

WHR Habitat Type	Total Acres Within Project Area	Number of Polygons	Number of Seral Stages	Average Species Richness	Average Habitat Suitability Value
Lacustrine	19,851.9	346	6	102.3	28.15
Montane Hardwood	13,867.1	733	10	200.0	92.30
Blue Oak/Foothill Pine	3,518.8	498	12	223.5	113.91
Valley Foothill Riparian	3,398.1	558	13	259.2	129.50
Montane Hardwood/Conifer	3,179.8	597	8	220.7	100.05
Annual Grassland	2,751.5	283	6	195.3	86.49
Barren	1,394.4	143	1	86.0	43.78
Freshwater Emergent Wetland	911.6	225	3	164.3	77.68
Urban	868.2	132	1	193.0	126.99
Blue Oak Woodland	793.3	210	10	193.6	114.51
Riverine	452.9	83	5	101.2	27.12
Mixed Chaparral	234.3	156	8	206.5	78.33
Douglas fir	169.6	8	1	195.0	78.05
Sierra Mixed Conifer	112.5	31	2	181.0	90.92

WHR Habitat Type	Total Acres Within Project Area	Number of Polygons	Number of Seral Stages	Average Species Richness	Average Habitat Suitability Value
Dryland Grain	98.3	12	1	110.0	42.76
Montane Riparian	54.3	97	4	209.7	115.06
Deciduous Orchard	11.0	20	3	99.6	45.45
Valley Oak Woodland	9.8	3	3	196.7	108.80
Evergreen Orchard	8.1	7	2	23.0	17.31
Irrigated Hayfield	3.3	1	1	165.0	64.73
Ponderosa Pine	3.2	1	1	165.0	90.26
Eucalyptus	2.6	4	3	239.3	75.67
Pasture	0.7	6	1	73.0	32.70
Vineyard	0.2	1	1	93.0	37.31

Twenty-four WHR habitat types were identified within the project area. The lacustrine habitat type is the dominant habitat type at 19,851 acres (38.3%) within the project area. Montane Hardwood is also common within the project area totaling 13,867 acres (26.7 %). These two habitat types dominate approximately 65 percent of the project area. However, the combined acreage of the twelve least common habitat types occur on less than 1 percent of the project area. These habitat types include Douglas Fir, Sierra Mixed Conifer, Dryland Grain, Montane Riparian, Deciduous Orchard, Valley Oak Woodland, Evergreen Orchard, Irrigated Hayfield, Ponderosa Pine, Eucalyptus, Pasture, and Vineyard. Three of these uncommon habitat types (Eucalyptus, Montane Riparian, and Valley Oak Woodland) exhibit high species richness values (i.e., >195 species). Further, two of these uncommon habitat types (Montane Riparian, and Valley Oak Woodland) also exhibit high average habitat suitability values (i.e., > 100).

Analyses of habitat mapping data indicate that larger size classes of tree dominated habitat types (>24 inch diameter average dbh) are rare within the project area. Pre-project land management related disturbances (fire/logging) may be responsible for the preponderance of small to medium size classes of tree habitat types. Further, WHR mapping identify no chaparral stands within the project area in the decadent size class another indication of more recent disturbance.

Although these data reflect current conditions, they may prove useful in evaluating potential Resource Action affects on biodiversity. For example, control or elimination of non-native species is the subject of several potential Resource Actions within the Environmental Work Group. Elimination of the minor amount of acreage of non-native Eucalyptus stands within the project area may adversely impact species biodiversity in a strongly negative manner. Another potential Resource Action involves gravel recruitment to the Feather River for salmon spawning purposes. Conversion of a portion of the extensive gravel barrens within the Oroville Wildlife Area to virtually any non-agricultural or aquatic habitat could serve to dramatically increase species richness

on those lands. However, careful evaluation of the species which utilize barren habitats or exhibit high habitat suitability values within barren habitats should also be considered in addition to total species richness information. Resource Actions which remove habitat types of limited distribution within the project area and exhibit high wildlife species richness should be discouraged if wildlife species biodiversity is to be maintained within the project area.

In addition to evaluation of biodiversity by habitat type it is also important to consider impacts to individual species. Species which occur in only a limited number of habitat types or have the highest habitat suitability values in a habitat type of limited distribution could be eliminated from the project area under some potential Resource Actions. To allow assessment of these potential impacts, WHR was modeled by species as well as by habitat.

Species Analyses

WHR analyses indicate that 334 wildlife species may occur within the habitat types present within the project area during some time during the year (Appendix F). These total species include;

- 13 species of amphibians
- 22 species of reptiles
- 64 species of mammals
- 235 species of birds

Appendix E also displays the habitat suitability values for each species in each habitat type. These data are useful for identifying those species restricted to a limited number of habitat types or whose greatest habitat values are present in uncommon habitat types. An example of this sort of impact analyses would be the water shrew which has the potential to occur in only 6 of the 24 habitat types. Further, this species exhibits high habitat values only within Montane Riparian habitat which is currently limited to 54 acres within the project area. Other species which are restricted to 3 or fewer habitat types within the project area include;

- American bittern
- Barrow's goldeneye
- black-backed woodpecker
- Clark's grebe
- common goldeneye
- common loon
- eared grebe
- greater scaup
- least bittern
- marsh wren

- pied-billed grebe
- redhead
- ring-necked duck
- ruddy duck
- sora
- Thayer's gull
- Virginia rail
- western grebe
- willow flycatcher
- yellow-billed cuckoo
- yellow-breasted chat

Of these 21 species, seven species are currently listed under the State or federal Endangered Species acts or are a State or federal Species of Concern. Further, twelve of these species are strongly associated with aquatic habitats (lacustrine or riverine). While both of these aquatic habitats display relatively low species richness in Table 5.6-1 (i.e., < 105 species) they provide habitat diversity and habitat for a few species which would be otherwise absent from the project area.

Species Documentation

An additional task requested within the Study Plan development process but not incorporated into any study plan was recording of all wildlife species observed by habitat type during the course of relicensing wildlife studies. Of the 334 species predicted by WHR to potentially occur within the project area, 190 species (56.8%) were detected during the course of wildlife field studies (Appendix G). This is a surprisingly high percentage considering that many of these species are only present within the project area for a brief period each year, are nocturnal, or are difficult to detect without specialized survey techniques.

A key to WHR size and cover types is presented in Table 5.3-1.

6.0 DISCUSSSION

6.1 VEGETATION

The project area is located both within the eastern edge of the Sacramento Valley and the lower foothills of the Sierra Nevada Mountain Range. Broad vegetation patterns in this area correspond with elevational changes from the valley floor to the upper elevations of the mountain range, ranging from valley grasslands to foothill woodlands to mixed conifer forests. Riparian and wetland habitats are associated with the margins of streams, rivers, and other areas that have abundant soil moisture. Each of these vegetation types is a mosaic of different plant assemblages that grow together in an area. These patterns vary from place to place and are dependent not only on elevation but precipitation, temperature, soils, aspect, slope, and disturbance history (SNEP 1996).

Lands around Lake Oroville and the Thermalito Diversion Pool are composed of open woodland, forest, and chaparral communities. At the lower end, the slopes are more moderate. Around the dam, Bidwell Canyon, Potter Ravine, and areas around the Diversion Pool, vegetation is mostly blue oak or mixed oaks, in varying proportions with foothill pine woodland, open grasslands, and small proportion of chaparral. Typical dominant species include interior and canyon live oaks, blue oak, foothill pine, and white-leaf manzanita. Approximately 1,100 acres of blue oak-foothill pine woodland with a chaparral component occur in the lower elevations around the Diverision Pool and Oroville Dam (Figure 6.1-1).

Figure 6.1-1. Blue oak-foothill pine woodland and woodland grassland habitats near the Diversion Pool and Lake Oroville.

Foothill pine-mixed oak woodland/chaparral occurs on over 1,400 acres in the project area and is common in the lower elevations around the mainstem of Lake Oroville

(Figure 6.1-2). Blue oaks drop out fairly quickly as the dominant woodland type with distance upstream from the Dam.

Figure 6.1-2. Foothill pine-mixed oak woodland/chaparral near Kelley Ridge and mixed oak/mixed pine woodlands.

The vegetation of the West Branch of the Feather River is heavily influenced by the cris-crossing of serpentine bands (Figure 6.1-3). At the southern end, blue oak woodlands continue in a mosaic with live oaks and grassy openings, but soon give rise to denser chaparral/mixed live oak habitats. Foothill pines quickly drop out and are replaced with ponderosa pines and black oaks as elevation and slopes increase. Vegetation on the serpentine soils tend to be more xeric and open, supporting sparse foothill pine/chaparral and unique vegetation types.

Figure 6.1-3. Steep slopes of the West Branch with dense mixed live oak and serpentine bands.

Along the North Fork of the Feather River, north-facing slopes and narrow canyon sides give rise to a cool, moist environment and changes from xeric/brush vegetation to dense Douglas fir/ponderosa pine/tanoak and other mixed hardwood/conifer types with black oaks, tanoaks, madrone and very tall canyon live oak. The grassland, blue oak, chaparral, and interior live oak component of the warmer west facing slopes and mainstem drop out along the North Fork (Figure 6.1-4).

Figure 6.1-4. Vegetation along the North Fork of the Feather River.

Vegetation along the Middle Fork responds to a change to granitic rock and decomposed granite soils. The vegetation of the south-facing slopes with open oaks, foothill pine, grass, and chaparral, starkly contrasts that of the north-facing slope, with ponderosa pine, live oaks, and black oaks. Farther up the canyon, the vegetation becomes mostly dense mixed conifer-hardwoods on the north-facing slopes and various more open fire-impacted ponderosa pine-live oak-shrub types on the rocky south-facing slopes. The South Fork, also has rather contrasting vegetation on either side due to north versus south-facing canyon walls. The vegetation also reflects to some degree two sharp changes in major underlying geology, from jumbled metavolcanic to granitic to other metavolcanic rock. On the south-facing side, dense to moderately open mixed oak woodland with some chaparral gives way to dense to moderate ponderosa pine/mixed oak woodland/chaparral. On the north-facing side, blue oak gives way to dense mixed oak stands and then to dense ponderosa pine, mixed oak forests. ponderosa pine/Douglas fir forests occur at the far eastern end (Figure 6.1-5).

Figure 6.1-5. Middle Fork and South Forks of the Feather River.

At the lower elevations of the project area, below Lake Oroville and the Thermalito Diversion Pool, California annual grassland and riparian/wetlands are the dominant vegetation types. Approximately 2,200 acres of annual grassland occur within the project area with the majority occurring in areas around the Thermalito Forebay and Afterbay (Figure 6.1-6). Typically these grasslands are dominated by non-native annual grasses with a profusion of spring flowering native bulbs. Smaller pockets of native perennial grasses, such as purple needlegrass, occur in this area. Vernal pools and swales are common throughout the valley grasslands. These have been mapped under Study Plan T3/5 and will be discussed in that report.

Figure 6.1-6. California annual grassland near Thermalito Afterbay.

Wetland vegetation occurs around both the margins of the Forebay and Afterbay (Figure 6.1-7). Typically, the margin of the Afterbay has a ring of rush (*Juncus effuses*) vegetation in the band where standing water occurs most frequently and soil moisture is retained even during pool drawdown. Above this band, a ring of rush/verbena occurs where standing water is not as frequent and/or for less duration. This band tends to have a high percentage of the noxious weed, purple loosestrife. Very little riparian

woodland occurs around the Afterbay with only scattered Fremont cottonwoods and occasional willows. The margin of the Forebay, with its more stable water level, has a higher percent cover of woody riparian species.

Figure 6.1-7. Wetland/riparian vegetation around Thermalito Afterbay.

Over 2,400 acres of Fremont cottonwood riparian, 490 acres of valley mixed riparian, 117 acres of cottonwood/black willow, and 99 acres of mixed willow riparian forests occurs in the project area (Figure 6.1-8). These are mostly located within the Oroville Wildlife Area (OWA) east of the Thermalito Afterbay. This area is predominantly gravel tailings and supports sparse to moderately open forests. Fire has been a common component in some areas of the OWA and has helped to maintain the open forest structure. Approximately 600 acres were mapped as open gravel tailings with little to no vegetation.

Figure 6.1-8. Riparian vegetation in the OWA and along the low-flow reach of the Feather River.

Aquatic/submerged vegetation occurs in ponds, along the margins of the river and canals, and in other areas where water occurs continuously (Figure 6.1-9). Three hundred and nineteen acres of ponds were mapped in the project area, most occurring within the OWA. Approximately 398 acres of water primrose occurs in the project area, mostly in the "D" Area of the OWA.

Figure 6.1-9. Water primrose in the "D" Area and water meal on one of the many ponds in the OWA.

Approximately 32,000 acres of land were mapped within the Feather River floodplain outside the project area, downstream to the confluence with the Sacramento River. Of this, 3,150 acres were mapped as river. The riparian vegetation in this area has been restricted over time by flood control levees, agriculture, and land clearing for urbanization (Figure 6.1-10). This has resulted in a narrow zone of vegetation along much of the river, sometimes being as little as one tree wide with little understory or structure. Some areas, however, do have a much more developed riparian vegetation zone. Below the project area, the riparian strip is bordered mostly by agricultural fields (16,173 acres). Yuba City is the only major urban area along the river below the project area. Pure stands of cottonwoods are not as common downstream as within the project area. Approximately 3,198 acres were mapped as mixed riparian forests and 634 acres as Fremont cottonwood forest. The most common species in the mixed forest were Fremont cottonwood, arroyo and black willows, box elder, alder, and Oregon ash. Downstream of Yuba City near the confluence, valley oak riparian becomes more common. One hundred and fourteen acres of valley oak riparian and 179 acres of valley oak/cottonwood riparian occur in this area. Riparian vegetation is discussed in more detail in the Study Plan T 3/5 Report.

Figure 6.1-10. Feather River riparian vegetation.

7.0 ANALYSIS

An analysis of project effects on wildlife and native plant communities will be included in separate study reports. Projects effects on wildlife and wildlife habitat will be included in Study Reports T1 – Project operation effects on wildlife; T2 – Special status animal species; and T9 – Recreation and wildlife. Project related impacts to plants and plant communities will be addressed in Study Reports T2 – Special Status Plant Species; T3/5 – Riparian and wetland communities; T7 – Noxious plant species; and T10 – project effects on upland plant communities.

8.0 REFERENCES

Bishop, J. 2003. Retired Oroville area CDF staff. Pers. Comm.

CDF 2003. Fire Perimeter GIS Data Layer. Fire and Resource Assessment Program

Clifton, G. 2003 draft. Plumas County and Plumas National Forest Flora. Unpublished document.

Fites, J., ed. 1995. Potential natural vegetation for West-side Sierra Nevada Mixed Conifer Forest. USFS Region 5. Field Manual.

Hickman, J.C. ed. 1993. The Jepson Manual: higher plants of California. University of California Press, Berekely, California.

Holland, R.F. 1986. Preliminary descriptions of the terrestrial natural communities of California. Unpublished document, California Department of Fish and Game Natural Heritage Division, Sacramento.

Mayer, K.E., and W.F. Laudenslayer Jr., eds. 1988. A guide to wildlife habitats in California. California Department of Forestry. Sacramento.

Memorandum of Understanding. 1991. California's coordinated regional strategy to conserve biological diversity. 5pp.

NOAA Website - National Oceanic Atmospheric Administration. NOAA's Biogeography Program. Habitat Digitizer Extension. Site acceessed 2001.

Oswald, Vern H. 1994. Manual of the Vascular Plants of Butte County, California. California Native Plant Society, Sacramento, California.

Parisi, M. 2001. WHR Wildlife Habitats crosswalked with CNPS Vegetation Series. Unpublished manuscript. California Department of Fish and Game. Sacramento.

Sawyer, John and Todd Keeler-Wolf, 1995. A Manual of California Vegetation. California Native Plant Society Press. 469 p.

Scott, M. J., B. Csuti, K. Smith, J. E. Estes, and S. Caicco. 1989. Beyond Endangered Species: An integrated conservation strategy for the preservation of biological diversity. Endangered Species Update, Volume 5 (10) pp 43-48.

SNEP 1996. Summary of the Sierra Nevada Ecosystem Project Report. University of California Davis. Centers for Water and Wildland Resources.

USFS Website - United States Forest Service. Fire Effects Information Sytem (FEIS) System Database. Site accessed 2003.

APPENDICES

Appendix A

Descriptions of Vegetation/Land-Use Associations

UPLAND FOREST/WOODLANDS

BFW - Blue oak-foothill pine woodland. Blue oak (*Quercus douglasii*) the dominant tree, but with substantial component of foothill pine (*Pinus sabiniana*) present in tree layer, usually as a sparse to moderately dense canopy. Usually forms a very patchy mosaic in lower to mid foothills on ridgelines and various warm exposures with grassland and chaparral species, but shrub component is minor.

BFC – Blue oak-foothill pine woodland/chaparral. Same as BFW but with a substantial chaparral understory of mixed shrub species or dominated by whiteleaf manzanita (see MAN for representative chaparral species),

BLO – Black oak woodland. Black oak (*Q. kelloggii*) the sole or heavily dominant tree species, in moderate to dense stands with occasional canyon live oaks and ponderosa pines, occupying somewhat cool, canyon ridges, scattered in the Middle and Nork Fork arms and the West Branch. Shrub (mixed chaparral species) and herb layers can be diverse in openings and at edges, and include toyon (*Heteromeles arbutifolia*) and California bay (*Umbellularia californica*).

BOC – Blue oak woodland/chaparral. Blue oak (*Quercus douglasii*) woodland with a substantial understory of mixed chaparral shrub species or chaparral dominated by whiteleaf manzanita (*Arctostaphylos viscida*); often has scattered foothill pine and/or interior live oak. Varies from extremely dense (the chaparral forming a continuous carpet) to sparse on very thin-soiled or rocky slopes; usually occupies south-facing slopes at lower elevations.

BOW – Blue oak woodland. Blue oak (*Quercus douglasii*) the only or dominant tree species; includes occasional foothill pines, interior live oaks, scattered shrubs; often patchy with a grassy understory. Varies from large oaks in open savanna in valleys to very small, stunted oaks on thin-soiled slopes. Intergrades with almost every other vegetation type, occupying mostly flat to warmer exposures in lower to mid foothills.

CLO – Canyon live oak woodland. Canyon live oak (*Q. chrysolepis*) the sole or heavily dominant tree species, with occasional black oaks or single conifers, occupying north-facing steep canyon slopes. Shrub and herb layers are minor or absent except at edges.

DFF - Douglas fir forest. Canopy dominated by Douglas fir (*Pseudotsuga mensziesii*), usually in dense stands, north-facing slopes of canyons farthest from the Valley- the far

ends of the North and Middle Fork canyons. Minor understory tree species may include occasional ponderosa pine (*Pinus ponderosa*), tanoak (*Lithocarpus densiflora*), mountain dogwood (*Cornus nuttallii*), madrone (*Arbutus menziesii*), and some canyon live oak (*Quercus chrysolepis*); shrub and herb layers are patchy, in moist openings and at edges.

FOC – Foothill pine-mixed oak woodland/chaparral. Same as FPO, with a substantial mixed chaparral shrub or whiteleaf-manzanita component; small live oaks often completely mixed into the shrub layer. Often quite dense, due to continuous chaparral carpet. Mid foothill elevations, on various warm exposures.

FPO - Foothill pine-mixed oak woodland. . Usually a sparse to moderately dense overstory of foothill pine (*Pinus sabiniana*) over an often dense canopy of mixed live oaks (mostly interior live oak (*Quercus wislizenii*), but occasionally includes blue oak), with only a minor mixed chaparral shrub or whiteleaf-manzanita component. Can be open to quite dense. Mid-foothill elevations, on various warm exposures.

FPC – Foothill pine woodland/mixed chaparral. Same as FOC but with no oaks, or minor component of small interior live oaks scattered within the chaparral; the foothill pine overstory is usually sparse to open. Chaparral often a pure stand of whiteleaf manzanita (*Arctostaphylos viscida*). Lower to mid foothills, on ridges, thin soil, steep warm exposures.

MCF - Mixed conifer forest. Canopy dominated by more conifers than hardwoods, usually in moderate to dense stands on higher-elevation northerly slopes, ridges and canyons. Typical tree species include ponderosa pine (*Pinus ponderosa*), Douglas fir (*Pseudotsuga mensziesii*), white fir (*Abies concolor*), incense cedar (*Calocedrus decurrens*), black oak (*Quercus kelloggii*), tanoak (*Lithocarpus densiflora*), mountain dogwood (*Cornus nuttallii*) and madrone (*Arbutus menziesii*); shrub and herb layers are patchy, in openings and at edges.

MCH - Mixed conifer-hardwood forest. Canopy dominated by approximately equal proportions of conifers and hardwoods, usually in very dense stands on northerly slopes and deep into river canyons. Typical tree species include ponderosa pine (*Pinus ponderosa*), Douglas fir (*Pseudotsuga mensziesii*), black oak (*Quercus kelloggii*), canyon live oak (*Q. chrysolepis*), tanoak (*Lithocarpus densiflora*) and madrone (*Arbutus menziesii*). Shrub and herb layers are minor or scattered at edges.

MOC - Mixed oak woodland/chaparral. Mixture of oak species, with occasional foothill pines, and abundant chaparral shrubs throughout, mixed in variable proportions with the oaks in a stand of highly variable density. Species consist mainly of Interior live oak (*Quercus wislizenii*), with either Canyon live oak (*Q. chrysolepis*) and/or blue oak (*Q. douglasii*) . Canopy can include scattered Buckeye (*Aesculus californica*) or California bay (*Umbellularia californica*) Very common, occupying many warmer slopes

in lower to mid-foothills, especially in the West Branch and lower end of the Middle and South Forks.

MOW - Mixed oak woodland. Mixture of oak species, usually in a moderate to dense canopy, with occasional foothill or ponderosa pines. Species consist mainly of Interior live oak (*Quercus wislizenii*), with either Canyon live oak (*Q*. *chrysolepis*) and/or blue oak (*Q. douglasii*) . Canopy can include scattered Buckeye (*Aesculus californica*), California bay (*Umbellularia californica*), black oak (*Q*. *kelloggii*) on cooler or higher slopes, and chaparral shrubs at edges. Occupies cooler and canyon-side slopes in mid to upper foothills.

MPC - Mixed pine woodland/chaparral. Usually a sparse to moderately dense overstory of both foothill (*Pinus sabiniana*) and ponderosa pines (*Pinus ponderosa*), over a moderate to dense cover of mixed chaparral shrubs; interior live oak (*Quercus wislizenii*) is only a minor component. Chaparral often a pure stand of whiteleaf manzanita (*Arctostaphylos viscida*). Mid-foothill elevations, on various warm exposures.

MPO - Mixed pine-mixed oak woodland. A dense mixture of varying proportions of both foothill (*Pinus sabiniana*) and ponderosa pines (*Pinus ponderosa*) with both nterior live oak (*Quercus wislizenii*) and canyon live oak (*Q*. *chrysolepis*). Black oak (*Q. kelloggii*), blue oak (*Q. douglasii*) and mixed chaparral species are frequently minor components. Mid-foothill elevations, on various moderate exposures.

PDF – Ponderosa pine-Douglas fir forest. Canopy dominated by ponderosa pine (*Pinus ponderosa*) and Douglas fir (*Pseudotsuga mensziesii*) in varying but roughly equal proportions, occupying north-facing slopes, some ridges, and deeper canyons. May include occasional madrone, canyon live oak, or black oak and minor to no herb or shrub layer except around edges.

PMO - Ponderosa pine -mixed oak woodland. Usually a moderate to dense stand, with an open overstory of Ponderosa pine (*Pinus ponderosa*) over an often dense canopy of mixed interior and canyon live oaks (*Quercus wislizenii* and *Q. chrysolepis*). Can include minor amounts of blue oak, black oak, mixed chaparral shrubs, or even occasional Douglas fir or foothill pine. Mid-foothill elevations, on various cool exposures, in all upper arms of the lake and other canyons.

PMC – Ponderosa pine-mixed oak woodland/chaparral. Same as PMO, with a substantial mixed chaparral shrub or whiteleaf-manzanita component. Pines can be open, while the vegetation overall is quite dense, due to continuous chaparral carpet. Oaks can be patchy. Mid foothill elevations, on various exposures. This is a very common association in all arms of the lake.

POC – Mixed pine-mixed oak woodland/chaparral. Same as MPO, with a substantial mixed chaparral shrub or whiteleaf-manzanita component; small live oaks often

completely mixed into the shrub layer. Pines can be sparse, while the vegetation overall is quite dense, due to continuous chaparral carpet. Mid foothill elevations, on various exposures. This is one of the most common associations around the Lake.

PPF – Ponderosa pine forest. Moderate to dense stands dominated by ponderosa pine (*Pinus ponderosa*), with only occasional hardwoods or other conifers. Shrub layer present, especially around edges. Mostly on southerly or other warm-exposure upper-elevation slopes and ridges.

UPLAND SHRUB/SCRUB

MAN - Whiteleaf manzanita chaparral. Usually almost pure *Arctostaphylos viscida*, sometimes includes *A*. *manzanita* or *A. mewukka*); can be patchy with occasional foothill pine, Interior live oak, other shrub species, or grassy areas. Occupies south-facing and thin-soiled or rocky slopes at lower elevations.

MXC – Mixed chaparral. Mixed shrub species(no one species clearly dominant) include whiteleaf manzanita (*Arctostaphylos viscida*), toyon (*Heteromeles arbutifolia*), coffeeberry (*Rhamnus tomentella*), buckbrush (*Ceanothus cuneatus*) and others. Can be patchy with grassy areas or occasional tree species, on various exposures in lower to mid foothills.

RIPARIAN FOREST/WOODLANDS

RFF – Foothill/montane mixed riparian forest. Usually very narrow, but sometimes dense, strips of woody species dependent upon perennial water supply immediately along streamcourses. No one species dominates; tree species include Fremont's cottonwood (*Populus fremontii*), alder (*Alnus rhombifolia*), willow (*Salix*) and sometimes sycamore (*Platanus racemosa*) in the valley edges and lower foothills; Bigleaf maple (*Acer macrophyllum*) and sometimes mtn. Dogwood (*Cornus nuttallii*) are added at mid elevations in cooler canyons. Typical associates include wild grape (*Vitis californica*), spicebush (*Calycanthus occidentalis*) and several fern species. Present at all elevations and all exposures, especially cooler canyons, often hidden within other wooded vegetation.

RFW – Mixed willow riparian forest. Open stands of mature willow trees (*Salix goodingii, S. laevigata*), with occasional Fremont cottonwood (*Populus fremontii*) individuals, usually single trees or groups of 2 to 3 around edges of Lake Oroville or occasionally along river edges in upper lake arms.

RIPARIAN SHRUB/SCRUB

RSM - Mixed riparian scrub. Mixed shrub species dependent upon perennial water supply immediately along streamcourses; includes no or very few mature trees, but may include tree seedlings. Shrub species include willows (Salix spp.), mulefat (*Baccharis salicifolia*), shrubby dogwoods(*Cornus glabrata, C. sessilis*), Mexican elderberry (Sambucus mexicana), Oregon ash (*Fraxinus latifolia*) as well as numerous native perennial and annual herbs.

RSW - Mixed willow scrub. Mixed shrubby willow species, immediately along streamcourses, including sandbar willow (*Salix exigua*), arroyo willow (*S. lasiolepis*), red willow (*S. laevigata*), yellow willow (*S. lucida* ssp. *lasiandra*) and occasional other riparian shrub species, usually in dense stands but sometimes sparse and interrupted. Usually occurs in small valley bottoms or near seeps or springs.

UPLAND HERBACEOUS

AGS – Annual grassland. A mixture of mostly non-native, introduced annual grasses such as oats, bromes, fescues and vulpias; includes native and non-native herbaceous annuals as well as numerous native perennial species growing from bulbs, rhizomes, and other underground parts. Occupies valley floors, patches within oak and other woodlands, at lower elevations, valley edges and into lower foothills on warmer exposures.

WETLAND

MXE – Mixed emergent vegetation. Usually dense stands of cattails (*Typha* spp), rushes (*Juncus* spp), sedges (*Carex* spp.) and other grasslike species (e.g. *Eleocharis* spp.) around pond or other open water edges, rooted in bottom muds and emerging above standing water. Sometimes used if unable to determine species composition.

WET – Seep/wet area. Usually localized, small dense stands of mixed perennial herbs, grasses and wetland species such as sedges or small rushes, and occasionally low shrubs, in low-lying areas within grasslands, usually along a drainage swale but sometimes a seepy area on a slope; usually no standing water.

DISTURBED/OTHER

DIS – Disturbed. Areas with little to no vegetation; usually obviously graded or cleared but with no urban structures.

GRT - Gravel tailings. Large area of tailing occur in the Project area, mostly in the OWA. Cobble to boulder size rock with little to no vegetation.

GRA - Gravel/sandbar. Areas with cobble, gravel, or sand sized substrates. Usually associated with the edges of the stream channel. Size of substrate tends to get smaller (sand) as you go downstream along the Feather River.

ROC-S – Rock outcrop-Serpentine. Sparsely vegetated to bare rocky area in aerial photos that is within or immediately adjacent to serpentine as mapped on geological map; usually has thinly scattered native annual and perennial grasses and herbs, occasional shrubs (e.g. Quercus durata, mixed chaparral species) and sometimes small foothill pines (*Pinus sabiniana*). The Serpentine edaphic association (Clifton 2001) can include several rare plant species, such as *Fritillaria eastwoodiae, Senecio eurycephalus* var. *lewisrosei*, *Calycadenia oppositifolia*, *Cardamine* spp. , and *Allium jepsonii*.

ROC-V – Rock outcrop-Volcanic. Sparsely vegetated to bare rocky area in aerial photos that is within or immediately adjacent to volcanic areas as mapped on geological map; usually basalt but sometimes Tuscan mudflow. Usually has very thinly scattered native annual and perennial grasses and herbs, often mixed with non-native grasses where adjacent to annual grassland.

ROC-O – Rock outcrop-Other. Sparsely vegetated to bare rocky area in aerial photos that is not within or immediately adjacent to serpentine or volcanic areas as mapped on geological map; often metamorphic or metasedimentary, or unknown origin. Usually has very thinly scattered native annual and perennial grasses and herbs, often mixed with non-native grasses where adjacent to annual grassland.

URB-U - Urban/disturbed. Areas most heavily disturbed with a higher percentage of buildings and paved ground cover. Usually very little planted vegetation, consisting mostly of non-native horticultural varieties.

URB-S - Residential. Areas along the outsides of the urban area, usually with a higher percentage of vegetation.

URB-R - Rural/Ranch. Large isolated parcels of land, with residential or farm buildings. Usually surrounded by agricultural fields or grasslands.

DISTURBED/AGRICULTURE

EUC _ Eucalyptus. Plantings of *Eucalyptus* sp. Usually found around houses, some plantations along Hwy. 70. Mostly out of the Project Area,

FAL – Fallow field. Fields that were obviously under recent agricultural practice. Most surrounded by walnut orchards, but were not planted at the time the photos were taken. This could vary from year to year so were given a young orchard stage for WHR.

Hay – Hayfield. Includes grass hayfield that are planted with non-native grass species, irrigated, and mowed.

ORC – Orchards. Includes both deciduous and evergreen orchards. Deciduous species include walnuts (most common), some prunes, and peaches. Evergreen species include olives and citrus varieties.

PAS – Pasture. Fields usually associated with rural/ranch sites. Areas most likely have some irrigation and are grazed, but don't appear to be mowed regularly.

RIC – Rice. A major cropland plant near the Afterbay. Occurs in the Feather River floodplain in the Sutter Bypass.

DGR/IRH – Row Crops. Includes both dryland and irrigated crops. Some dryland row crops are found with the Project Area around the Afterbay. These are mostly planted for waterfowl feed. Both types also occur in the Feather River floodplain, usually associated with orchards or rural/ranch sites.

PLT – Plantation. Young to medium-aged ponderosa pine (Pinus ponderosa) in regular planted rows in previously clear-cut site; usually in surrounding Mixed conifer forest or other wooded areas.

VIN – Vineyard. Small amounts of vine species planted in the study area, includes grapes and kiwi fruit.

OPEN WATER

CAN – Canal. Varies from large irrigation canals lined with concrete to small dirt-lined irrigation ditches.

LAK – Lake. Large bodies of water – mostly Lake Oroville, Thermalito Forebay and Thermalito Afterbay.

PON – Ponds. Small bodies of water. Ponds scattered throughout the Oroville Wildlife Area (OWA) are remnants of gravel mining and are lined with large cobble. Other smaller bodies outside the OWA include stock ponds, small reservoirs, and natural ponds.

Riv – Riverine. Intermittent to continually flowing water. Included Feather River and it's tributaries.

AQUATIC/SUBMERGED

ALA – Algae. Unknown species of algae floating near shore of small ponds in OWA and in backwater areas along the Feather River.

MAA – Mixed aquatic. Usually more than one species of aquatic vegetation present or identification to species isn't possible from aerial photos. Found along shores of small ponds in OWA and along backwater areas along the Feather River.

MFA – Mosquito fern. Species of *Azolla* floating near edges of ponds in the OWA.

WPA – Water primrose. Dense stands of the native water primrose (*Ludwigia peploides peploides*) cover vast areas in the OWA where water has some current. It is also found in pockets along the edge of the Feather River and in thicker pockets in the backwater areas. The non-native species *L. peploides montevidensis* occurs along the river and some canals, but not near as abundant as the native species.

WMA – Water Meal. These small species of *Wolffia* sp. tend to form blankets across some of the ponds in the OWA, giving a lime green appearance to the water. It is also found in the back water areas of the Feather River

Appendix B

Vegetation Maps

Appendix C

WHR Maps

Appendix D

Plant species found within the FERC Project Area during 2002/2003 special status plant species surveys, riparian/wetland studies, and noxious weed surveys

Special status plant species are printed in bold, non-italic typeface, e.g. **Calycadenia oppositifolia.** Other California native plant names are printed in bold, italicized font, e.g. ***Azolla filiculoides***. Non-native plant names are printed in italics, e.g. *Vinca major*.

FAMILY	*Genus species*	Common Name	Origin	CNPS List	At lake	Below dam
FERNS AND FERN ALLIES						
AZOLLACEAE						
	Azolla filiculoides	Large mosquito-fern	native			x
BLECHNACEAE						
	Woodwardia fimbriata	Giant chain fern	native			x
DENNSTAEDTIACEAE						
	Pteridium aquilinum* var. *pubescens	Bracken fern	native		x	
DRYOPTERIDACEAE						
	Dryopteris arguta	Coastal wood fern	native		x	
	Polystichum sp.	Sword fern	native		x	
	Polystichium imbricans ssp. imbricans	Narrow-leaved sword fern	native		x	
	Polystichium munitum	Western sword fern	native		x	
EQUISETACEAE						
	Equisetum arvense	Common horsetail	native		x	x
	Equisetum hyemale* ssp. *affine	Common scouring rush	native		x	
	Equisetum laevigatum	Smooth scouring-rush	native			x
ISOETACEAE						
	***Isoetes* sp.**	Quillwort	native		x	
MARSILIACEAE						

FAMILY	*Genus species*	Common Name	Origin	CNPS List	At lake	Below dam
	Marsilea vestita* ssp. *vestita	Hairy pepperwort	native			x
	Pilularia americana	American pillwort	native			x
POLYPODIACEAE						
	Polypodium callirhiza	Intermediate polypody	native		x	
PTERIDACEAE						
	Adiantum capillus-veneris	Southern maidenhair	native		x	x
	Adiantum jordanii	California maidenhair	native		x	
	Aspidotis densa	Indian's dream	native		x	
	Pellaea mucronata var. mucronata	Common bird'sfoot fern	native		x	
	Pentagramma triangularis ssp. triangularis	Gold-backed fern	native			x
	Pentagramma triangularis ssp. Semipallida	Silver-backed fern	native		x	
SELAGINELLACEAE						
	***Selaginella* sp.**	Spikemoss	native		x	

CONIFERS

CUPRESSACEAE					
Calocedrus decurrens	Incense-cedar	native		x	
Cupressus arizonica	Arizonia cypress	native			x
Juniperus sp.		non			x
PINACEAE					
Pinus ponderosa	Ponderosa pine	native		x	
Pinus sabiniana	Gray pine	native		x	x
Pseudotsuga menziesii var. menziesii	Douglas fir	native		x	
TAXACEAE					
Torreya californica	California nutmeg	native		x	

DICOTS

ACERACEAE					
Acer macrophyllum	Big-leaf maple	native		x	

FAMILY	*Genus species*	Common Name	Origin	CNPS List	At lake	Below dam
ANACARDIACEAE						
	Pistacia chinensis	Ornamental pistachio	non			x
	Rhus ovata	Sugar bush	native			x
	Rhus trilobata	Skunkbrush	native		x	
	Schinus molle	Peruvian pepper tree	non			x
	Toxicodendron diversilobum	Western poison oak	native		x	x
APIACEAE						
	Anthriscus caucalis	Bur-chervil	non		x	x
	Daucus pusillus	Rattlesnakeweed	native			x
	Eryngium castrense	Coyote-thistle	native		x	x
	Foeniculum vulgare	Fennel	non		x	x
	Hydrocotyle umbellata	Umbellate marsh-pennywort	native			x
	Lomatium dasycarpum ssp. tomentosum	Woolly-fruited lomatium	native			x
	Lomatium marginatum var. marginatum	Margined lomatium	native		x	
	Lomatium utriculatum	Bladder lomatium	native			x
	Perideridia bolanderi ssp. involucrata	Involucrate yampah	native		x	
	Perideridia kelloggii	Kellogg's yampah	native		x	
	Perideridia lemmonii	Lemmon's yampah	native		x	
	Sanicula bipinata	Poison sanicle	native		x	x
	Sanicula bipinnatifida	Purple sanicle	native		x	x
	Sanicula crassicaulis	Pacific sanicle	native		x	
	Sanicula tuberosa	Turkey pea	native		x	
	Scandix pecten-veneris	Shepherd's needle	non			x
	***Tauschia* sp.**	Tauschia	native		x	
	Torilis arvensis ssp. *arvensis*	Common hedge-parsley	non		x	x
	Torilis arvensis ssp. p*urpurea*	Purple hedge-parsely	non		x	
	Torilis nodosa	Knotted hedge-parsley	non			x
APOCYNACEAE						
	Apocynum cannabinum	Indian hemp	native			x
	Nerium oleander	Oleander	non		x	
	Vinca major	Periwinkle	non		x	
ARISTOLOCHIACEAE						

FAMILY	*Genus species*	Common Name	Origin	CNPS List	At lake	Below dam
	Aristolochia californica	California pipevine	native		x	x
	Asarum hartwegii	Hartweg's wild ginger	native		x	
ASCLEPIADACEAE						
	Asclepias cordifolia	Purple milkweed	native		x	
	Asclepias fascicularis	Narrow-leaved milkweed	native		x	x
ASTERACEAE						
	Achillea millifolium	Yarrow	native		x	x
	Achyrachaena mollis	Blowwives	native			x
	Agoseris grandiflora	Large-flowered agoseris	native		x	x
	Agoseris retrorsa	Spear-leaved agoseris	native		x	
	Ambrosia artemisiifolia	Annual ragweed	non			x
	Anthemis cotula	Mayweed	non		x	x
	Artemisia douglasiana	Mugwort	native		x	x
	Aster chilensis* ssp. *chilensis	California aster	native			x
	Aster oregonensis	White-topped aster	native		x	
	Baccharis pilularis	Coyote-bush	native		x	x
	Balsamorhzia deltoidea	Deltoid balsamroot	native		x	x
	Bidens frondosa	Beggarticks	native		x	x
	Blennosperma nanum* var. *nanum	Yellow-carpet	native			x
	Brickellia californica	California brickellbush	native		x	x
	Calycadenia multiglandulosa	Sticky calycadenia	native		x	
	Calycadenia oppositifolia	**Butte County calycadenia**	**native**	**1B**	**x**	**x**
	Calycadenia spicata	Spiked calycadenia	native			x
	Calycadenia truncata	Rosinweed	native		x	
	Carduus pycnocephalus	Italian thistle	non		x	x
	Centaurea melitensis	Tocalote	non		x	
	Centaurea solstitialis	Yellow star-thistle	non		x	x
	Chaenactis glabriscula* var. *heterocarpha	Yellow pincushion	native		x	
	Chamomilla suaveolens	Common pineapple-weed	non		x	x
	Chondrilla juncea	Skeleton weed	non		x	
	Cichorium intybus	Chicory	non		x	x
	Cirsium occidentale* var. *venustum	Venus thistle	native		x	x
	Cirsium vulgare	Bull thistle	non		x	x

FAMILY	*Genus species*	Common Name	Origin	CNPS List	At lake	Below dam
	Conyza canadensis	Horseweed	native		x	x
	Cotula coronopifolia	Brassbuttons	non		x	x
	Eclipta prostrata	False daisy	native			x
	Ericameria arborescens	Goldenfleece	native		x	
	Erigeron inornatus* var. *inornatus	California rayless daisy	native		x	
	Erigeron philadephicus	Philadelphia daisy	native		x	
	Eriophyllum lanatum* var. *grandiflorum	Large-flowered wooly sunflower	native		x	x
	Filago californica	California filago	native			x
	Filago gallica	Narrow-leaved filago	non			x
	Gnaphalium canescens* ssp. *beneolens	Fragrant cudweed	native			x
	Gnaphalium luteo-album	Weedy cudweed	non		x	x
	Gnaphalium palustre	Western marsh cudweed	native		x	
	Gnaphalium purpureum	Purple cudweed	native			x
	Grindelia camporum ssp. camporum	Valley gumplant	native			x
	Grindelia hirsutula var. davyi	Foothill gumplant	native		x	
	Helenium puberulum	Sneezeweed	native		x	x
	Helianthella californica var. nevadensis	Sierra Nevada helianthella	native		x	
	Hemizonia fitchii	Fitch's spikeweed	native		x	x
	Hemizonia pungens ssp. pungens	Common spikeweed	native		x	x
	Hesperevax acaulis var. acaulis	Dwarf evax	native			x
	Hesperevax acaulis var. robustior	Robust evax	native		x	
	Heterotheca oregona var. compacta	Goldenaster	native			x
	Hieracium albiflorum	White-flowered hawkweed	native		x	
	Hieracium scouleri var. scouleri	Scouler's hawkweed	native		x	
	Hypochaeris glabra	Smooth cat's-ear	non		x	x
	Hypochaeris radicata	Rough cat's ear	non		x	x
	Lactuca serriola	Prickly lettuce	non		x	x
	Lagophylla glandulosa	Glandular hareleaf	native		x	x
	Layia fremontii	Fremont's tidytips	native			x
	Lasthenia californica	California goldfields	native			x
	Lasthenia fremontii	Fremont's goldfields	native			x
	Lasthenia glaberrima	Smooth goldfields	native			x
	Lasthenia platycarpha	Alkali goldfields	native			x

FAMILY	*Genus species*	Common Name	Origin	CNPS List	At lake	Below dam
	Lessingia nana	Dwarf lessingia	native			x
	Lessingia nemaclada	Slender-stemmed lessingia	native		x	
	Lessingia virgata	Wand lessingia	native			x
	Madia elegans* ssp. *elegans	Common madia	native		x	x
	Madia gracilis	Slender tarweed	native		x	x
	Madia madioides	Woodland madia	native		x	
	Malacothrix floccifera	Woolly malacothrix	native		x	
	Micropus californicus* var. *californicus	Slender cottonweed	native		x	x
	Microseris sylvatica	**Woodland microseris**	**native**	**4**	**x**	
	Picris echioides	Bristly ox-tongue	non		x	x
	Psilocarphus brevissimus var. *brevissimus*	Dwarf woolly-marbles	native			x
	Psilocarphus oregonus	Oregon woolly-marbles	native			x
	Psilocarphus tenellus var. *tenellus*	Slender woolly-marbles	native			x
	Senecio eurycephalus var. lewisrosei	**Lewis Rose's ragwort**	**native**	**1B**	**x**	
	Senecio vulgaris	Old-man-in-the-spring	non			x
	Silybum marianum	Milk-thistle	non		x	x
	***Solidago* sp.**	Goldenrod	native		x	
	Sonchus asper	Spiny-leaved sow-thistle	non		x	x
	Stephanomeria elata	Santa Barbara stephanomeria	native		x	
	Taraxacum officinale	Dandelion	non		x	x
	Tragopogon dubius	Yellow salsify	non		x	x
	Uropappus lindleyi	Silverpuffs	native		x	x
	Wyethia angustifolia	Narrow-leaved mule's ears	native		x	
	Wyethia bolanderi	Bolander's mule's ears	native		x	
	Xanthium spinosum	Spiny cocklebur	native		x	x
	Xanthium strumarium	Cocklebur	native		x	x
BERBERIDACEAE						
	Berberis aquifolium* var. *dictyota	Jepson's barberry	native		x	
BETULACEAE						
	Alnus rhombifolia	White alder	native			x

FAMILY	*Genus species*	Common Name	Origin	CNPS List	At lake	Below dam
BORAGINACEAE						
	Amsinckia lycopsoides	Bugloss fiddleneck	native			x
	Amsinckia menziesii* var. *intermedia	Common fiddleneck	native			x
	Amsinckia menziesii* var. *menziesii	Menzies' fiddleneck	native			x
	Cryptantha flaccida	Weak-stemmed cryptantha	native		x	
	Cryptantha intermedia	Common cryptantha	native		x	
	Cynoglossum grande	Pacific hound's tongue	native		x	
	Heliotropium curassavicum	Wild heliotrope	native		x	
	Myosotis discolor	Yellow scorpion-grass	non		x	
	Pectocarya penicillata	Winged pectocarya	native		x	
	Plagiobothrys austinae	Austin's popcorn flower	native			x
	Plagiobothrys bracteatus	Bracted popcorn-flower	native		x	
	Plagiobothrys fulvus	Fulvous popcorn-flower	native			x
	Plagiobothrys greenei	Greene's popcorn-flower	native			x
	Plagiobothrys stipitatus* var. *micranthus	Small-flowered stalked popcorn-flower	native			x
BRASSICACEAE						
	Arabis glabra*var. *glabra	Tower-mustard	native		x	
	Athysanus pusillus	Pretty anthysanus	native		x	
	Cardamine oligosperma	Western bittercress	native		x	x
	Cardamine pachystigma var. dissectifolia	**Dissected-leaved toothwort**	**native**	**3**	**x**	
	Erysimum capitatum* ssp. *capitatum	Western wallflower	native		x	
	Hirschfeldia incana	Mediterranean hoary-mustard	non			x
	Lepidium nitidum* var. *nitidum	Shining peppergrass	native			x
	Lepidium strictum	Upright peppergrass	native			x
	Raphanus raphanistrum	Jointed charlock	non			x
	Raphanus sativus	Wild radish	non		x	x
	Rorippa nasturtium-aquaticum	Watercress	native		x	x
	Streptanthes drepanoides	**Sickle-fruited jewelflower**	**native**	**4**	**x**	
	Streptanthus polygaloides	Milkwort jewelflower	native		x	
	Thysanocarpus radians	Spokepod	native			x
CACTACEAE						

FAMILY	Genus species	Common Name	Origin	CNPS List	At lake	Below dam
Opuntia sp.		Prickly pear cactus	non			x
CALLITRICHACEAE						
Callitriche marginata		Winged water-starwort	native			x
CALYCATHANACEAE						
Calycanthus occidentalis		Western spicebush	native		x	
CAMPANULACEAE						
Campanula prenanthoides		California harebell	native		x	
Downingia bella		Hoover's downingia	native			x
Downingia bicornuta var. bicornuta		Double-horned downingia	native			x
Downingia cuspidata		Toothed downingia	native			x
Downingia ornatissima var. ornatissima		Ornate downingia	native			x
Heterocodon rariflorum		Heterocodon	native		x	
Githopsis sp.		Bluecup	native		x	
Githopsis speculariodes		Common bluecup	native			x
CAPRIFOLIACEAE						
Lonicera hispidula* var. *vacillans		Hairy honeysuckle	native		x	
Lonicera interrupta		Chaparral honeysuckle	native		x	x
Sambucus mexicana		Blue elderberry	native		x	x
Symphoricarpos albus* var. *laevigatus		Common snowberry	native		x	x
CARYOPHYLLACEAE						
Cerastium glomeratum		Sticky mouse-eared chickweed	non			x
Lychnis coronaria		Mullein-pink	non		x	
Minuartia californica		California sandwort	native			x
Minuartia douglasii		Douglas' sandwort	native		x	x
Paronychia ahartii		**Ahart's nailwort**	**native**	**1B**		**x**
Petrorhagia dubia		Grass pink	non		x	x
Sagina apetala		Dwarf pearlwort	native			x
Saponaria officinalis		Bouncing-bet	non			x
Silene californica		Indian pink	native		x	x
Silene gallica		Windmill pink	non			x

FAMILY	*Genus species*	Common Name	Origin	CNPS List	At lake	Below dam
	Spergula arvensis ssp. *arvensis*	Cornspurry	non		x	
	Spergularia bocconei	Boccone's sandspurry	non			x
	Stellaria media	Common chickweed	non			x
	Velezia rigida	Velezia	non		x	x
CERATOPHYLLACEAE						
	Ceratophylla demersum	Hornwort	native			x
CHENOPODIACEAE						
	Chenopodium album	Lamb's-quarters	non			x
	Chenopodium ambrosioides var. *ambrosioides*	Mexican tea	non			x
CONVOLVULACEAE						
	Calystegia occidentalis* var. *occidentalis	Western morning glory	native		x	x
	Convolvulus arvensis	Bindweed	non		x	
CORNACEAE						
	Cornus nuttallii	Mountain dogwood	native		x	
	Cornus sessilis	Black-fruited dogwood	native		x	
CRASSULACEAE						
	Crassula aquatica	Water pygmyweed	native			x
	Crassula connata	Pygmyweed	native			x
	Dudleya cymosa ssp. cymosa	Canyon dudleya	native			x
	Parvisedum pumilum	Dwarf-stonecrop	native		x	x
	Sedum spathulifolium	Broad-leaved stonecrop	native		x	
CUCURBITACEAE						
	Marah watsonii	Taw manroot	native		x	
CUSCUTACEAE						
	Cuscuta californica* var. *californica	California dodder	native		x	
	Cuscuta howelliana	Boggs Lake dodder	native			x
	Cuscuta indecora* var. *indecora	Dodder	native			x
ERICACEAE						
	Arbutus menziesii	Pacific madrone	native		x	

FAMILY	*Genus species*	Common Name	Origin	CNPS List	At lake	Below dam
	Arctostaphylos manzanita ssp. manzanita	Big manzanita	native		x	x
	Arctostaphylos mewukka* ssp. *mewukka	Indian manzanita	native		x	
	Arctostaphylos viscida	White-leaved manzanita	native		x	
EUPHORBIACEAE						
	Chamaesyce maculata	Spotted spurge	non			x
	Chamaesyce ocellata*ssp. *ocellata	Valley spurge	native			x
	Chamaesyce serpyllifolia* ssp. *serpyllifolia	Thyme-leaved spurge	native		x	x
	Eremocarpus setigerus	Turkey mullein	native		x	x
	Sapium sebiferum	Chinese tallow tree	non		x	
FABACEAE						
	Acaica baileyana	Cootamundra wattle	non			x
	Acacia melanoxylon	Blackwood acacia	non			x
	Albizia julibrissin	Silktree	non			x
	Cercis occidentalis	Western redbud	native		x	x
	Cytisus scoparius	Scotch broom	non			x
	Genista monspessulana	French-broom	non		x	x
	Gleditsia tricanthos	Honey-locust	non			x
	Glycyrrhiza lepidota	American licorice	native			x
	Hoita macrostachya	Large leather-root	native		x	
	Lathyrys sulphureus	Snub pea	native		x	
	Lathyrus tingitanus	Tangier pea	non			x
	Lotus argophyllus* var. *fremontii	Silver-leaved lotus	native		x	
	Lotus corniculatus	Bird-foot trefoil	non		x	x
	Lotus purshianus* var. *purshianus	Spanish lotus	native		x	x
	Lotus scoparius* var. *scoparius	California broom	native			x
	Lotus strigosus	Strigose lotus	native		x	
	Lupinus albicaulis	Sickle-keeled lupine	native		x	
	Lupinus albifrons* var. *albifrons	Silver bush lupine	native		x	x
	Lupinus bicolor	Bicolored lupine	native			x
	Lupinus microcarpus* var. *densiflorus	White-whorled lupine	native			x
	***Lupinus microcarpus* var.**	Chick lupine	native		x	

FAMILY	*Genus species*	Common Name	Origin	CNPS List	At lake	Below dam
	microcarpus					
	Lupinus nanus	Sky lupine	native		x	x
	Lupinus pachylobus	Big-podded lupine	native			x
	Lupinus stiversii	Harlequin lupine	native		x	
	Medicago polymorpha	California bur-clover	non		x	x
	Melilotus albus	White sweetclover	non		x	
	Melilotus officinalis	Yellow sweetclover	non		x	x
	Pisum sativum	Garden pea	non		x	x
	Sesbania punicea	Scarlet wisteria	non			x
	Spartium junceum	Scotch broom	non		x	
	Trifolium campestre	Hop clover	non			x
	Trifolium depauperatum* var. *depauperatum	Dwarf cowbag clover	native			x
	Trifolium dubium	Little hop clover	non		x	x
	Trifolium glomeratum	Sessile-headed clover	non			x
	Trifolium hirtum	Rose clover	non		x	x
	Trifolium incarnatum	Crimson clover	non			x
	Trifolium microcephalum	Small-headed clover	native			x
	Trifolium repens	White clover	non			x
	Trifolium subterraneum	Subterranean clover	non			x
	Trifolium tomentosum	Woolly-fruited clover	non			x
	Trifolium variegatum	White-tipped clover	native			x
	Trifolium wildenovii	Tomcat clover	native		x	x
	Vicia sativa ssp. *sativa*	Spring vetch	non		x	x
	Vicia villosa	Winter vetch	non			x
FAGACEAE						
	Lithocarpus densiflorus* var. *densiflorus	Tan oak	native		x	
	Quercus berberidifolia	Scrub oak	native		x	
	Quercus chrysolepis	Canyon live oak	native		x	
	Quercus douglasii	Blue oak	native		x	x
	Quercus kelloggii	California black oak	native		x	
	Quercus lobata	Valley oak	native		x	x
	Quercus wislizenii* var. *wislizenii	Interior live oak	native		x	x
GENTIANACEAE						
	Centaurium muehlenbergii	June centaury	native		x	x

FAMILY	*Genus species*	Common Name	Origin	CNPS List	At lake	Below dam
	Centaurium venustum	Canchalagua	native		x	
	Cicendia quadrangularis	Timwort	native			x
	Swertia albicaulis var. nitida	Shining white-stemmed swertia	native		x	
GERANIACEAE						
	Erodium cicutarium	Red-stemmed filaree	non		x	x
	Erodium botrys	Long-beaked stork's-bill	non		x	x
	Erodium moschatum	White-stemmed filaree	non		x	x
	Geranium dissectum	Cut-leaved geranium	non		x	x
	Geranium pusillum	Small geranium	non			x
GROSSULARIACEAE						
	Ribes nevadense	Mountain pink currant	native		x	
HAMAMELIDACEAE						
	Hamamelis vernalis	Witchazel	non		x	
HALORAGACEAE						
	Myriophyllum spicatum	Eurasian milfoil	non			x
HIPPOCASTANACEAE						
	Aesculus californica	California buckeye	native		x	x
HYDROPHYLLACEAE						
	Draperia systyla	Draperia	native		x	
	Eriodictyon californicum	California yerba-santa	native		x	x
	Hydrophyllum occidentale	California waterleaf	native		x	
	Nemophila pendunculata	Meadow nemophila	native		x	
	Phacelia sp.		native		x	
HYPERICACEAE						
	Hypericum anagalloides	Tinker’s penny	native		x	
	Hypericum concinnum	Goldwire	native		x	
	Hypericum mutilum	Small-flowered St. John's wort	non			x
	Hypericum perforatum	Klamathweed	non		x	x
JUGLANDACEAE						

FAMILY	*Genus species*	Common Name	Origin	CNPS List	At lake	Below dam
	Juglans californica var. hindsii	**Northern California black walnut**	**native**	**1B**	**x**	**x**
	Carya illinoisnensis	Pecan	non			x
LAMIACEAE						
	Agastache urticifolia	Horsemint	native		x	
	Lepechinia calycina	California pitcher-sage	native		x	
	Lycopus americanus	Cut-leaved bugleweed	native			x
	Marrubium vulgare	Horehound	non		x	x
	Melissa officinalis	Bee-balm	non			x
	Mentha pulegium	Pennyroyal	non			x
	Mentha spicata	Spearmint	non		x	x
	Monardella sheltonii	Shelton's coyote-mint	native		x	x
	Monardella lanceolata	Mustang-mint	native		x	
	Monardella villosa ssp. villosa	Hairy coyote-mint	native		x	
	Pogogyne zizyphoroides	Sacramento Valley pogogyne	native			x
	Prunella vulgaris var. lanceolata	Mountain self-heal	native			x
	Pycnanthemum californicum	Sierra-mint	native		x	
	Satureja douglasii	Yerba buena	native		x	
	Scutellaria californica	California skullcap	native		x	x
	Scutellaria tuberosa	Danny's skullcap	native		x	
	Stachys pycnantha	Short-spiked hedge nettle	non		x	x
	Stachys stricta	Sonoma hedge-nettle	native		x	x
	Trichostemma lanceolatum	Vinegar weed	native		x	x
LAURACEAE						
	Umbellularia californica	California bay	native		x	
	Cinnamomum camphorum	Camphor tree	non			x
LENTIBULARIACEAE						
	Utricularia gibba	Humped bladderwort	non			x
LIMNANTHACEAE						
	Limnanthes alba* ssp. *alba	White meadowfoam	native			x
	Limnanthes douglasii* ssp. *rosea	Rosy meadowfoam	native			x

FAMILY	*Genus species*	Common Name	Origin	CNPS List	At lake	Below dam
LINACEAE						
	Hesperolinon californicum	California western flax	native			x
	Linum bienne	Pale flax	non		x	x
LOASACEAE						
	Mentzelia laevicaulis	Giant blazingstar	native			x
LYTHRACEAE						
	Ammania coccinea	Valley redstem	native			x
	Ammania robusta	Robust redstem	native			x
	Lythrum hyssopifolium	Hyssop loosestrife	non		x	x
	Lythrum salicaria	Purple loosestrife	non			x
	Rotala ramosior	Lowland toothcup	native			x
MALVACEAE						
	Malvella leprosa	Alkali mallow	native		x	
	Modiola carolinianum	Carolina bristle-mallow	non			x
	Sidalcea calycosa* ssp. *calycosa	Annual checkerbloom	native			x
	Sidalcea diplocypha	Fringed checkerbloom	native		x	x
	Sidalcea hartwegii	Hartweg's checkerbloom	native		x	
	Sidalcea hirsuta	Hairy checkerbloom	native			x
	Sidalcea malveflora ssp. asprella	Harsh checkerbloom	native		x	x
MOLLUGINACEAE						
	Mollugo verticillata	Indian chickweed	non		x	x
MORACEAE						
	Ficus carica	Edible fig	non		x	x
	Morus alba	White mulberry	non			x
MYRTACEAE						
	Eucalyptus globulus	Blue-gum euclayptus	non			x
OLEACEAE						
	Fraxinus dipetala	California ash	native			x
	Fraxinus latifolia	Oregon ash	native		x	x
	Olea europaea	Olive	non			x

FAMILY	*Genus species*	Common Name	Origin	CNPS List	At lake	Below dam
Ligustrum sp.		Privet	non			x
ONAGRACEAE						
Clarkia biloba ssp. brandegeae		**Brandegee's clarkia**	**native**	**1B**	**x**	**x**
Clarkia concinna* ssp. *concinna		Redribbons	native		x	
Clarkia gracilis spp. albicaulis		**White-stemmed clarkia**	**native**	**1B**	**x**	
Clarkia purpurea* ssp. *quadrivulnera		Purple clarkia	native		x	x
Clarkia mosquinii		**Mosquin's clarkia**	**native**	**1B**	**x**	
Clarkia rhomboidea		Diamond clarkia	native		x	
Clarkia unguiculata		Elegant clarkia	native		x	x
Epilobium brachycarpum		Tall annual willowherb	native		x	x
Epilobium canum ssp. latifolium		California fuchsia	native		x	x
Epilobium cleistogamum		Cleistogamous spike-primrose	native			x
Epilobium densiflorum		Dense-flowered spike-primrose	native		x	x
Epilobium pygmaeum		Smooth spike-primrose	native			x
Epilobium sp.		Primrose	native		x	
Ludwigia peploides ssp. *montevidensis*		Montevideo waterweed	non			x
Ludwigia peploides* ssp. *peploides		Yellow waterweed	native			x
Oenothera elata* ssp. *hirsutissima		Hairy evening primrose	native			x
OROBANCHACEAE						
Orobanche unifloravar. uniflora		Naked broom-rape	native		x	x
Orobanche fasciculata		Clustered broom-rape	native		x	

OXALIDACEAE					
Oxalis corniculata	Creeping wood-sorrel	non		x	x
Oxalis pes-caprae	Bermuda buttercup	non			x
PAPAVERACEAE					
Eschscholzia caespitosa	Foothill poppy	native		x	
Eschscholzia californica var.	California poppy	native			x

FAMILY	*Genus species*	Common Name	Origin	CNPS List	At lake	Below dam
	californica					
	Eschscholzia lobbii	Fryingpans	native			x
PHILADELPHACEAE						
	Philadelphus lewisii	Mock orange	native		x	x
PHYTOLACCACEAE						
	Phytolacca americana	American pokeweed	non			x
PLANTAGINACEAE						
	Plantago coronopus	Cut-leaved plantain	non			x
	Plantago elongata	Elongate plantain	native			x
	Plantago erecta	Erect plantain	native		x	x
	Plantago lanceolata	English plantain	non		x	x
PLATANACEAE						
	Platanus racemosa	California sycamore	native		x	x
POLYGALACEAE						
	Polygala cornuta* var. *cornuta	Sierra milkwort	native			x
POLEMONIACEAE						
	Gilia captitata* ssp. *pedemontana	Foothill globe gilia	native		x	
	Linanthus bicolor	Bicolored linanthus	native		x	x
	Linanthus ciliatus	Whiskerbrush	native		x	
	Linanthus filipes	Wild baby's breath	native		x	
	Linanthus parviflorus	Small-flowered linanthus	native		x	
	***Linanthus* sp.**		native		x	
	Navarretia filicaulis	Thread-stemmed navarretia	native		x	
	Navarretia intertexta* ssp. *intertexta	Needle-leaved navarretia	native			x
	Navarretia leucocephala* ssp. *leucocephala	White-flowered navarretia	native			x
	Navarretia pubescens	Downy navarretia	native		x	x
	Navarretia tagetina	Marigold navarretia	native		x	x
	Navarretia viscidula	Sticky navarretia	native			x
	Phlox specisosa*ssp. *occidentalis	Western showy phlox	native		x	

FAMILY	*Genus species*	Common Name	Origin	CNPS List	At lake	Below dam
POLYGONACEAE						
	Chorizanthe polygonoides* var. *polygonoides	Knotweed spineflower	native		x	
	Eriogonum nudum		native		x	x
	Eriogonum roseum	Wand buckwheat	native			x
	Eriogonum umbellatum	Bright sulfur-flower	native		x	
	Eriogonum umbellatum var. nov.	Ahart's sulphur-flower	native		x	
	Eriogonum vimineum	Wicker buckwheat	native		x	
	Polygonum arenastrum	Common knotweed	non		x	x
	Polygonum californicum	California knotweed	native		x	x
	Polygonum hydropiper	Water-pepper	non			x
	Polygonum lapathifolium	Willow weed	native			x
	Polygonum punctatum	Dotted smartweed	native			x
	Pterostegia drymariodes	Pterostegia	native		x	
	Rumex acetosella	Common sheep sorrel	non			x
	Rumex crispus	Curly dock	non		x	x
	Rumex salicifolius* var. *salicifolius	Willow dock	native			x
PORTULACACEAE						
	Calandrinia ciliata	Redmaids	native			x
	Claytonia parviflora	Small-flowered miner's lettuce	native		x	
	Claytonia perfoliata	Miner's lettuce	native		x	x
PUNICACEAE						
	Punica granatum	Pomegranate	non		x	
PRIMULACEAE						
	Anagallis arvensis	Scarlet pimpernel	non		x	x
	Centunculus minimus	Chaffweed	native			x
	Dodecatheon hendersonii	Henderson's shootingstar	native		x	
	Trientalis latifolia	Pacific starflower	native		x	
RANUNCULACEAE						
	Clematis lasiantha	Chaparral clematis	native		x	x
	Delphinium hansenii ssp. hansenii	Hansen's larkspur	native		x	x

FAMILY	*Genus species*	Common Name	Origin	CNPS List	At lake	Below dam
	Delphinium variegatum ssp. variegatum	Royal larkspur	native		x	
	Kumlienia hystricula	Waterfall buttercup	native		x	
	Myosorus minimus	Common mousetail	native			x
	Ranunculus aquatilis var. aquatilis	Broad-leaved water buttercup	native			x
	Ranunculus arvensis	Field buttercup	non			x
	Ranunculus bonariensis* var. *trisepalus	Three-sepaled buttercup	native			x
	Ranunculus muricatus	Prickle-seeded buttercup	non			x
	Ranunculus occidentalis* var. *occidentalis	Western buttercup	native			x
	***Ranunculus* sp.**	Buttercup	native		x	
RHAMNACEAE						
	Ceanothus cuneatus* var. *cuneatus	Buck brush	native		x	x
	Ceanothus integerrimus	Deerbrush	native		x	
	Rhamnus ilicifolia	Holly-leaved redberry	native		x	x
	Rhamnus rubra	Sierra coffeeberry	native		x	
	Rhamnus tomentella* ssp. *tomentella	Hoary coffeeberry	native		x	x
	Ziziphus jujuba	Common jujube	non		x	
ROSACEAE						
	Aphanes occidentalis	Western lady's mantle	native			x
	Cercocarpus betuloides var. betuloides	Birch leaved mountain mahogany	native		x	x
	Heteromeles arbutifolia	Toyon	native		x	x
	Holodiscus discolor	Oceanspray	native		x	
	Horkelia californica ssp. dissita	Tall horkelia	native		x	
	Horkelia tridentata ssp. tridentata	Three-toothed horkelia	native		x	
	Malus sylvestris	apple	non		x	
	Potentilla glandulosa* ssp. *glandulosa	Sticky cinquefoil	native		x	x
	Potentilla gracilis* var. *fastigiata	Slender cinquefoil	native		x	
	Prunus cerisifera	Cherry plum	non			x
	Prunus dulcis	almond	non			x
	Prunus sp.	cultivated plum	non		x	
	Pyracantha fortuneana	Chinese firethorn	non			x

FAMILY	*Genus species*	Common Name	Origin	CNPS List	At lake	Below dam
	Rosa californica	California wild rose	native		x	x
	Rubus discolor	Himalyan blackberry	non		x	x
	Rubus glaucifolius	Creeping raspberry	native		x	
	Rubus pensilvanicus	Pennsylvania blackberry	non		x	x
	Rubus ursinus	California blackberry	native		x	x
RUBIACEAE						
	Cephalanthus occidentalis* var. *californicus	California button-willow	native		x	x
	Crucianella angustifolia	Crosswort	non		x	x
	Galium aparine	Cleavers	native			x
	Galium bolanderi	Bolander's bedstraw	native		x	
	Galium divaricatum	Lamarck's bedstraw	non			x
	Galium porrigens* var. *tenue	Narrow-leaved climbing bedstraw	native		x	x
	Sherardia arvensis	Field madder	non		x	x
SALICACEAE						
	Populus fremontii* ssp. *fremontii	Fremont's cottonwood	native		x	x
	Salix exigua	Sandbar willow	native		x	x
	Salix gooddingii	Goodding's black willow	native		x	x
	Salix laevigata	Red willow	native		x	x
	Salix lasiolepis	Arroyo willow	native		x	x
	Salix melanopsis	Dusky willow	native		x	
SAXIFRAGACEAE						
	Heuchera micrantha* var. *erubescens	Crevice alumroot	native		x	
	Lithophragma sp.	Woodlandstar	native		x	
	Saxifraga sp.	Saxifrage	native		x	
	Tellima grandiflora	Fringecups	native		x	
SCROPHULARIACEAE						
	Antirrhinum vexillo-calyculatum* ssp. *intermedium	Wiry snapdragon	native		x	
	Castilleja attenuata	Valley-tassels	native		x	x
	Castilleja affinis* var. *affinis	Indian-paintbrush	native			x
	Castilleja campestris	Field owl-clover	native			x
	Castilleja lacera	Cut-leaved owl-clover	native		x	x

FAMILY	*Genus species*	Common Name	Origin	CNPS List	At lake	Below dam
	Collinsia heterophylla	Chinese houses	native		x	
	Collinsia tinctoria	Sticky chinese houses	native		x	x
	Cordylanthus pilosus* ssp. *trifidus	Trifid bird's beak	native		x	
	Gratiola ebracteata	Bractless hedge-hyssop	native			x
	Keckiella breviflora* ssp. *glabrisepala	Gaping keckiella	native		x	x
	Limosella acaulis	Narrow-leaved mudwort	native			x
	Lindernia dubia* var. *anagallidea	False pimpernel	native			x
	Mimulus aurantiacus* ssp. *aurantiacus	Bush monkey-flower	native		x	x
	Mimulus cardinalis	Scarlet monkey-flower	native		x	x
	Mimulus glaucescens	**Shield-bracted monkey-flower**	**native**	**4**	**x**	
	Mimulus guttatus	Seep monkey-flower	native		x	x
	Mimulus inconspicuus	**Small-flowered monkey-flower**	**native**	**4**	**x**	
	Mimulus moschatus	Musk monkey-flower	native			x
	Mimulus torreyi	Torrey's monkeyflower	native		x	
	Mimulus tricolor	Tri-colored monkey-flower	native			x
	Parentucellia viscosa	Yellow parentuchellia	non		x	x
	Pedicularis densiflora	Indian-warrior	native		x	
	Penstemon laetus var. leptosepalus	Western graybeard	native		x	
	Triphysaria eriantha ssp. eriantha	Johnnytuck	native			x
	Tryphysaria pusilla	Dwarf owl-clover	native		x	
	Verbascum blattaria	Moth mullein	non		x	x
	Verbascum thapsus	Woolly mullein	non		x	x
	Veronica americana	American brooklime	native			x
	Veronica anagallis-aquatica	Great water speedwell	non		x	x
	Veronica peregrina* ssp. *halapensis	Purslane speedwell	native			x
SIMARUBACEAE						
	Ailanthus altissima	Tree-of-heaven	non		x	x
SOLANACEAE						
	Datura ferox	Chinese thorn-apple	non		x	
	Datura stramonium var. *stramonium*	White-stemmed jimsonweed	non		x	

FAMILY	*Genus species*	Common Name	Origin	CNPS List	At lake	Below dam
	Nicotiana acuminata var. *multiflora*	Many-flowered tobacco	non		x	
	Nicotiana glauca	Tree tobacco	non			x
	Physalis acutifolia	Sharp-leaved ground-cherry	native			x
	Physalis lanceifolia	Lance-leaved ground-cherry	non			x
	Solanum parishii	Parish's nightshade	native		x	
STYRACACEAE						
	Styrax officinalis* var. *rediviva	California snowbell	native			x
URTICACEAE						
	Urtica dioica* ssp. *holosericea	Hoary creek nettle	native		x	x
VALERIANACEAE						
	***Plectritis* sp.**	Plectritis	native		x	
	Centranthus ruber	Red valerian	non			x
VERBENACEAE						
	Phyla nodiflora var. *rosea*	Rosy lippia	non			x
	Verbena hastata	Halberd-leaved vervain	native		x	x
VIOLACEAE						
	Viola odorata	English violet	non			x
VISCACEAE						
	Arceuthobium occidentale	Gray pine dwarf mistletoe	native		x	x
	Phoradendron villosum	Hairy mistletoe	native		x	
VITACEAE						
	Vitis californica	California wild grape	native		x	x

MONOCOTS

ALISMATACEAE					
Alisma plantago-aquatica	Water-plantain	native		x	x
Echinodorus berteroi	Burhead	native			x
Sagittaria montevidensis* ssp. *calycina	Montevideo arrowhead	native			x
Sagittaria sanfordii	**Sanford's arrowhead**	**native**	**1B**		**x**

FAMILY	*Genus species*	Common Name	Origin	CNPS List	At lake	Below dam
CYPERACEAE						
	Carex barbarae	Santa Barbara sedge	native			x
	Carex bolanderi	Bolander's sedge	native		x	
	Carex densa	Dense sedge	native			x
	Carex feta	Green-sheathed sedge	native		x	
	Carex fracta	Fragile-sheathed sedge	native		x	
	Carex hirtissima	Fuzzy sedge	native		x	
	Carex multicaulis	Many-stemmed sedge	native		x	
	Carex nudata	Torrent sedge	native		x	
	Carex praegracilis	Clustered field sedge	native		x	
	Carex vulpinoidea	**Fox sedge**	**native**	**2**		**x**
	Carex sp.	(in Acutae group)	native		x	
	Cyperus difformis	Small-flowered cyperus	non			x
	Cyperus eragrostis	Tall cyperus	native		x	x
	Cyperus erythrorhizos	Red-rooted cyperus	native			x
	Cyperus iria	Iria sedge	non			x
	Cyperus niger	Black cyperus	native		x	x
	Cyperus squarrosus	Awned cyperus	native			x
	Cyperus strigosus	False nutsedge	native		x	x
	Eleocharis acicularis var. acicularis	Needle spike-rush	native		x	x
	Eleocharis atropurpurea	Purple spike-rush	native			x
	Eleocharis macrostachya	Pale spike-rush	native		x	x
	Eleocharis obtusa var. engelmannii	Engelmann's spike-rush	native			x
	Eleocharis pachycarpa	Thick-fruited spike-rush	non		x	x
	Eleocharis quadrangulata	**Four-angled spikerush**	**native**	**2**		**x**
	Eleocharis radicans	Rooting spikerush	native			x
	Scirpus acutus* var. *occidentalis	Hard-stemmed tule	native		x	x
	Scirpus mucronatus	Rough-seeded bulrush	non			x
	Scirpus setaceus	Bristle-leaved bulrush	non		x	
HYDROCHARITACEAE						
	Elodea canadensis	Canadian waterweed	native			x
IRIDACEAE						

FAMILY	*Genus species*	Common Name	Origin	CNPS List	At lake	Below dam
	Iris hartwegii* ssp. *hartwegii	Hartweg's iris	native		x	
	Iris macrosiphon	Long-tubed iris	native		x	x
	Iris psuedacorus	Yellow water-iris	non			x
	Sisyrinchium bellum	Blue-eyed grass	native		x	
JUNCACEAE						
	Juncus acuminatus	Sharp-fruited rush	native			x
	Juncus articulatus	Jointed rush	native		x	
	Juncus balticus var. balticus	Baltic rush	native		x	x
	Juncus bufonius var. bufonius	Common toadrush	native		x	x
	Juncus capitatus	Leafy-bracted dwarf rush	non		x	x
	Juncus diffusissimus	Diffuse rush	non			x
	Juncus effusus* var. *exiguus	Short rush	native		x	
	Juncus mexicanus	Mexican rush	native		x	x
	Juncus oxymeris	Pointed rush	native		x	
	Juncus tenuis	Slender rush	native		x	x
	Juncus uncialis	Inch-high rush	native			x
	Juncus xiphioides	Iris-leaved rush	native			x
	Luzula comosa*var. *subsessilis	Sessile wood-rush	native		x	
LEMNACEAE						
	***Lemna* sp.**	Duckweed	native			x
	Wolffia borealis	Northern water-meal	native			x
	Wolffia brasiliensis	**Brazilian water-meal**	**native**	**2**		**x**
LILIACEAE						
	Allium amplectens	Clasping onion	native			x
	Allium peninsulare* var. *peninsulare	Mexican onion	native		x	x
	Brodiaea californica	California brodiaea	native			x
	Brodiaea coronaria* var. *coronaria	Harvest brodiaea	native			x
	Brodiaea elegans* ssp. *elegans	Elegant brodiaea	native		x	x
	Brodiaea minor	Bluestars	native			x
	Calochortus albus	Fairy lantern	native		x	x
	Calochortus luteus	Yellow mariposa-lily	native			x
	Calochortus monophyllus	Yellow star tulip	native		x	
	Calochortus superbus	Superb mariposa-lily	native		x	

FAMILY	*Genus species*	Common Name	Origin	CNPS List	At lake	Below dam
	Calochortus tolmiei	Pussy-ears	native		x	
	Chlorogalum angustifolium	Narrow-leaved soap plant	native			x
	Chlorogalum pomeridianum* var. *pomeridianum	Wavy-leaved soap plant	native		x	x
	Dichelostemma capitatum* ssp. *capitatum	Bluedicks	native		x	x
	Dichelostemma multiflorum	Round-toothed ookow	native			x
	Dichelostemma volubile	Twining ookow	native		x	x
	Erythronium multiscapoideum	Sierra fawn-lily	native		x	
	***Fritillaria* sp.**	fritillary	native		x	
	Fritillaria eastwoodiae	**Butte County fritillary**	**native**	**1B**	**x**	
	Lilium humboldtii ssp. humboldtii	**Humboldt lily**	**native**	**4**	**x**	**x**
	Odontostomum hartwegii	Hartweg's odontostomum	native			x
	Triteleia bridgesii	Bridge's triteleia	native		x	
	Triteleia hyacinthina	Wild hyacinth	native		x	x
	Triteleia ixiodes ssp. anilina	Mountain prettyface	native		x	
	Triteleia ixiodes* ssp. *scabra	Foothill prettyface	native		x	
	Triteleia laxa	Ithuriel's spear	native		x	x
	Zigadenus fremontii	Fremont's zigadene	native			x
ORCHIDACEAE						
	Goodyera oblongifolia	Rattlesnake-plantain	native		x	
	Piperia elongata	Dense-flowered rein orchid	native		x	x
	Piperia transversa	Cross-spurred piperia	native		x	
	Piperia unalascensis	Alaska piperia	native		x	
POACEAE						
	Aegilops cylindrica	Jointed goatgrass	non		x	x
	Agrostis exarata	Spiked bentgrass	native			x
	Agrostis viridis	Water bentgrass	non		x	
	Aira caryophyllea	Silver European hairgrass	non		x	x
	Alopecurus saccatus	Vernal pool foxtail	native			x
	Andropogon virginicus var. *virginicus*	Broomsedge bluestem	non		x	x
	Aristida oligantha	Oldfield three-awn	native		x	x
	Arundo donax	Giant-reed	non			x
	Avena barbata	Slender wild oat	non		x	x

FAMILY	*Genus species*	Common Name	Origin	CNPS List	At lake	Below dam
Avena fatua		Wild oat	non		x	x
Brachypodium distachyon		False brome	non		x	x
Briza maxima		Greater quaking grass	non		x	x
Briza minor		Lesser quaking grass	non		x	x
Bromus arenarius		Australian brome	non			x
Bromus carinatus* var. *carinatus		California brome	native		x	
Bromus catharticus		Rescuegrass	non			x
Bromus diandrus		Ripgut grass	non		x	x
Bromus hordeaceus		Softchess	non		x	x
Bromus laevipes		Woodland brome	native		x	x
Bromus madritenis ssp. *rubens*		Foxtail chess	non		x	x
Cortaderia selloana		Pampasgrass	non			x
Crypsis vaginiflora		African pricklegrass	non			x
Cynodon dactylon		Bermuda grass	non		x	x
Cynosurus echinatus		Hedgehog dogtail	non		x	x
Dactylis glomerata		Orchardgrass	non		x	
Deschampsia danthonioides		Annual hairgrass	native			x
Digitaria ischaemum		Smooth crabgrass	non			x
Digitaria sanguinalis		Hairy crabgrass	non		x	x
Distichlis spicata		Saltgrass	native			x
Echinochloa crus-galli		Barnyard grass	non			x
Elymus elymoides		Squirreltail	native		x	x
Elymus glaucus* ssp. *glaucus		Blue wildrye	native		x	x
Elymus glaucus* ssp. *jepsonii		Jepson's wild rye	native		x	
Elytrigia sp.		Wheatgrass	non			x
Eragrostis pectinacea* var. *pectinacea		Purple lovegrass	native			x
Festuca californica		California fescue	native		x	
Gastridium ventricosum		Nitgrass	non		x	x
Hainardia cylindrica		Barbgrass	native			x
Holcus lanatus		Common velvetgrass	non		x	x
Hordeum brachyantherum		Meadow barley	native			x
Hordeum jubatum		Foxtail barley	native			x
Hordeum marinum ssp. *gussoneanum*		Mediterranean barley	non		x	x
Hordeum murinum ssp. *leporinum*		Hare wall barley	non		x	x
Leersia oryzoides		Rice cutgrass	non		x	x

FAMILY	*Genus species*	Common Name	Origin	CNPS List	At lake	Below dam
	Leymus triticoides	Alkali ryegrass	native		x	x
	Lolium multiflorum	Italian ryegrass	non		x	x
	Melica californica	California melic	native		x	x
	Melica geyeri	Geyer's melic	native		x	
	Melica torreyana	Torrey's melic	native			x
	Muhlenbergia rigens	Deer grass	native		x	x
	Nassella pulchra	Purple needlegrass	native		x	x
	Panicum acuminatum var. lindheimeri	Redtop panicgrass	native			x
	Panicum capillare	Witchgrass	native		x	x
	Panicum dichotomiflorum	Smooth witchgrass	non			x
	Paspalum dilatatum	Dallisgrass	non		x	x
	Phalaris aquatica	Harding-grass	non		x	x
	Phalaris caroliniana	Carolina canarygrass	non			x
	Phalaris minor	Lesser canarygrass	non			x
	Poa annua	Annual bluegrass	non		x	x
	Poa bulbosa	Bulbous bluegrass	non		x	
	Poa tenerrima	Delicate bluegrass	native			x
	Polypogon australis	Southern beardgrass	non			x
	Polypogon maritimus	Mediterranean beardgrass	non			x
	Polypogon monspeliensis	Annual beardgrass	non		x	x
	Seteria viridis	Green bristlegrass	non		x	x
	Sorghum halapense	Johnsongrass	non		x	x
	Taeniatherum caput-medusae	Medusa-head	non		x	x
	Vulpia microstachys* var. *ciliata	Fringed fescue	native			x
	Vulpia myuros var. *myuros*	Rattail fescue	non		x	x
POTAMOGETONACEAE						
	Potamogeton sp.	Pondweed	native			x
TYPHACEAE						
	Typha dominguensis	Southern cattail	native		x	x
	Typha latifolia	Broad-leaved cattail	native		x	x
ZANNICHELLIACEAE						
	Zannichellia palustris	Horned pondweed	native			x

Appendix E

WHR Predictions of Wildlife Species Richness By Habitat Type and Seral Stage

Appendix E. CWHR predictions of species richness by habitat type and seral stage

Habitat Type	Seral Stage	Acreage	Amphibians	Reptiles	Birds	Mammals	Total
Blue oak woodland	1 (seedling tree)	0	11	19	115	51	196
Blue oak woodland	**2S (sapling tree sparse)**	**10.18**	**11**	**19**	**140**	**42**	**212**
Blue oak woodland	**2P (sapling tree open)**	**2.67**	**12**	**19**	**128**	**51**	**210**
Blue oak woodland	2M (sapling tree moderate)	0	11	19	119	47	196
Blue oak woodland	2D (sapling tree dense)	0	9	17	96	47	169
Blue oak woodland	**3S (pole tree sparse)**	**31.74**	**6**	**19**	**139**	**51**	**215**
Blue oak woodland	**3P (pole tree open)**	**57.63**	**12**	**19**	**134**	**52**	**217**
Blue oak woodland	**3M (pole tree moderate)**	**156.95**	**12**	**20**	**121**	**48**	**201**
Blue oak woodland	**3D (pole tree dense)**	**50.55**	**10**	**16**	**110**	**44**	**180**
Blue oak woodland	**4S (small tree sparse)**	**30.71**	**12**	**19**	**137**	**51**	**219**
Blue oak woodland	**4P (small tree open)**	**141.49**	**12**	**19**	**136**	**51**	**218**
Blue oak woodland	**4M (small tree moderate)**	**212.10**	**12**	**19**	**127**	**47**	**205**
Blue oak woodland	**4D (small tree dense)**	**99.31**	**10**	**16**	**112**	**42**	**180**
Blue oak woodland	5S (medium/large tree sparse)	0	12	19	136	49	216
Blue oak woodland	5P (medium/large tree open)	0	12	19	135	49	215
Blue oak woodland	5M (medium/large tree moderate)	0	12	19	124	43	198
Blue oak woodland	5D (medium large tree dense)	0	10	16	112	39	177
Blue oak-Foothill pine	1 (seedling tree)	0	11	18	121	50	200
Blue oak-Foothill pine	**2S (sapling tree sparse)**	**0.37**	**10**	**18**	**137**	**50**	**215**
Blue oak-Foothill pine	**2P (sapling tree open)**	**10.81**	**11**	**18**	**134**	**50**	**213**
Blue oak-Foothill pine	**2M (sapling tree moderate)**	**67.49**	**11**	**18**	**124**	**47**	**200**
Blue oak-Foothill pine	**2D (sapling tree dense)**	**2.58**	**10**	**16**	**106**	**47**	**179**
Blue oak-Foothill pine	**3S (pole tree sparse)**	**43.00**	**11**	**18**	**145**	**49**	**223**
Blue oak-Foothill pine	**3P (pole tree open)**	**290.91**	**11**	**18**	**143**	**49**	**221**
Blue oak-Foothill pine	**3M (pole tree moderate)**	**912.22**	**11**	**18**	**139**	**48**	**216**
Blue oak-Foothill pine	**3D (pole tree dense)**	**2174.39**	**10**	**15**	**126**	**46**	**197**
Blue oak-Foothill pine	**4S (small tree sparse)**	**10.11**	**11**	**18**	**146**	**50**	**225**
Blue oak-Foothill pine	**4P (small tree open)**	**0.87**	**11**	**18**	**144**	**49**	**222**
Blue oak-Foothill pine	**4M (small tree moderate)**	**4.25**	**11**	**18**	**140**	**46**	**215**
Blue oak-Foothill pine	**4D (small tree dense)**	**1.89**	**10**	**15**	**119**	**43**	**187**
Blue oak-Foothill pine	5S (medium/large tree sparse)	0	11	18	145	48	222
Blue oak-Foothill pine	5P (medium/large tree open)	0	11	18	142	48	219
Blue oak-Foothill pine	5M (medium/large tree moderate)	0	11	18	136	43	208
Blue oak-Foothill pine	5D (medium large tree dense)	0	10	15	119	39	183
Annual grassland	1S (short, sparse cover)	0	10	18	110	54	192

Appendix E. CWHR predictions of species richness by habitat type and seral stage

Habitat Type	Seral Stage	Acreage	Amphibians	Reptiles	Birds	Mammals	Total
Annual grassland	**1P (short, open cover)**	**4.20**	**10**	**18**	**113**	**54**	**195**
Annual grassland	**1M (short, moderate cover)**	**41.80**	**10**	**18**	**113**	**54**	**195**
Annual grassland	**1D (short, dense cover)**	**17.83**	**10**	**17**	**110**	**54**	**191**
Annual grassland	2S (tall, sparse cover)	0	10	18	107	54	189
Annual grassland	**2P (tall, open cover)**	**146.56**	**10**	**18**	**105**	**54**	**187**
Annual grassland	**2M (tall, moderate cover)**	**284.02**	**10**	**18**	**98**	**54**	**180**
Annual grassland	**2D (tall, dense cover)**	**2257.10**	**10**	**15**	**94**	**54**	**173**
Habitat Type	**Seral Stage**	**Acreage**	**Amphibians**	**Reptiles**	**Birds**	**Mammals**	**Total**
Freshwater emergent wetland	1S (short, sparse cover)	0	11	10	110	29	160
Freshwater emergent wetland	1P (short, open cover)	0	11	10	112	30	163
Freshwater emergent wetland	1M (short, moderate cover)	0	10	10	107	30	157
Freshwater emergent wetland	1D (short, dense cover)	0	10	10	101	30	151
Freshwater emergent wetland	2S (tall, sparse cover)	0	11	10	111	30	162
Freshwater emergent wetland	**2P (tall, open cover)**	**22.83**	**11**	**10**	**110**	**30**	**161**
Freshwater emergent wetland	**2M (tall, moderate cover)**	**420.62**	**10**	**10**	**104**	**30**	**154**
Freshwater emergent wetland	**2D (tall, dense cover)**	**468.24**	**10**	**10**	**96**	**30**	**146**
Barren	**no stages**	**1394.44**	**0**	**1**	**62**	**23**	**86**
Urban	**no stages**	**868.22**	**4**	**7**	**147**	**35**	**193**
Evergreen orchard	1 Seedling/sapling	0	3	7	21	42	73
Evergreen orchard	**2 young tree**	**4.89**	**0**	**0**	**23**	**0**	**23**
Evergreen orchard	**3 mature tree**	**3.21**	**0**	**0**	**23**	**0**	**23**
Valley-foothill riparian	**1 (seedling tree)**	**14.61**	**10**	**20**	**147**	**56**	**233**
Valley-foothill riparian	**2S (sapling tree sparse)**	**126.57**	**11**	**19**	**162**	**56**	**248**
Valley-foothill riparian	**2P (sapling tree open)**	**248.97**	**11**	**19**	**157**	**55**	**242**
Valley-foothill riparian	**2M (sapling tree moderate)**	**93.73**	**10**	**19**	**148**	**54**	**231**
Valley-foothill riparian	**2D (sapling tree dense)**	**17.93**	**10**	**19**	**134**	**55**	**218**
Valley-foothill riparian	**3S (pole tree sparse)**	**155.05**	**11**	**20**	**166**	**57**	**254**
Valley-foothill riparian	**3P (pole tree open)**	**222.80**	**11**	**20**	**160**	**57**	**248**
Valley-foothill riparian	**3M (pole tree moderate)**	**154.56**	**10**	**19**	**153**	**56**	**238**
Valley-foothill riparian	**3D (pole tree dense)**	**51.59**	**10**	**16**	**142**	**54**	**222**
Valley-foothill riparian	**4S (small tree sparse)**	**79.59**	**11**	**20**	**167**	**57**	**255**
Valley-foothill riparian	**4P (small tree open)**	**579.42**	**11**	**20**	**164**	**57**	**252**
Valley-foothill riparian	**4M (small tree moderate)**	**788.92**	**10**	**20**	**157**	**54**	**241**
Valley-foothill riparian	**4D (small tree dense)**	**864.38**	**10**	**17**	**147**	**52**	**226**
Valley-foothill riparian	5S (medium/large tree sparse)	0	11	20	161	56	248

Appendix E. CWHR predictions of species richness by habitat type and seral stage

Habitat Type	Seral Stage	Acreage	Amphibians	Reptiles	Birds	Mammals	Total
Valley-foothill riparian	5P (medium/large tree open)	0	11	20	161	55	247
Valley-foothill riparian	5M (medium/large tree moderate)	0	10	19	153	52	234
Valley-foothill riparian	5D (medium large tree dense)	0	10	16	146	49	221
Lacustrine	**1 (open water)**	**15095.73**	**4**	**3**	**61**	**12**	**80**
Lacustrine	**2O (organic substrate submerged)**	**443.43**	**9**	**5**	**74**	**17**	**105**
Lacustrine	**2M (mud substrate submerged)**	**3681.77**	**10**	**5**	**75**	**17**	**107**
Lacustrine	2S (sand substrate submerged)		9	5	73	17	104
Lacustrine	**2G (gravel/cobble substrate submerged)**	**297.19**	**8**	**3**	**66**	**16**	**93**
Lacustrine	**2R (rubble/boulders substrate submerged)**	**310.57**	**7**	**3**	**57**	**16**	**83**
Lacustrine	2B (bedrock substrate submerged)	0	4	3	57	16	80
Lacustrine	3O (organic substrate periodically submerged)	0	5	5	82	15	107
Lacustrine	**3M (mud substrate periodically submerged)**	**23.27**	**6**	**5**	**86**	**15**	**112**
Lacustrine	3S (sand substrate periodically submerged)	0	6	5	80	15	106
Lacustrine	3G (gravel/cobble substrate periodically submerged)	0	4	3	62	14	83
Lacustrine	3R (rubble/boulders substrate periodically submerged)	0	3	3	44	14	64
Lacustrine	3B (bedrock substrate periodically submerged)	0	3	3	43	14	63
Lacustrine	4O (organic substrate exposed)	0	4	5	86	14	109
Lacustrine	4M (mud substrate exposed)	0	4	4	89	14	111
Lacustrine	4S (sand substrate exposed)	0	4	4	81	15	104
Lacustrine	4G (gravel/cobble substrate exposed)	0	5	2	66	16	89
Lacustrine	4R (rubble/boulders substrate exposed)	0	4	2	42	15	63
Habitat Type	**Seral Stage**	**Acreage**	**Amphibians**	**Reptiles**	**Birds**	**Mammals**	**Total**
Riverine	**1 (open water)**	**283.06**	**5**	**3**	**49**	**17**	**74**
Riverine	2O (organic substrate submerged)	0	8	4	64	22	98
Riverine	2M (mud substrate submerged)	0	9	4	63	22	98
Riverine	2S (sand substrate submerged)	0	9	4	61	22	96
Riverine	2G (gravel/cobble substrate submerged)	0	9	4	53	20	86
Riverine	2R (rubble/boulders substrate submerged)	0	7	4	50	21	82
Riverine	**2B (bedrock substrate submerged)**	**1.33**	**6**	**4**	**50**	**21**	**81**
Riverine	3O (organic substrate periodically submerged)	0	6	4	70	20	100
Riverine	**3M (mud substrate periodically submerged)**	**87.75**	**7**	**4**	**73**	**20**	**104**
Riverine	3S (sand substrate periodically submerged)	0	7	4	68	20	99
Riverine	**3G (gravel/cobble substrate periodically submerged)**	**65.03**	**8**	**4**	**52**	**19**	**83**
Riverine	3R (rubble/boulders substrate periodically submerged)	0	7	4	37	19	67
Riverine	**3B (bedrock substrate periodically submerged)**	**15.68**	**5**	**4**	**37**	**19**	**65**

Appendix E. CWHR predictions of species richness by habitat type and seral stage

Habitat Type	Seral Stage	Acreage	Amphibians	Reptiles	Birds	Mammals	Total
Riverine	4O (organic substrate exposed)	0	4	4	76	19	103
Riverine	4M (mud substrate exposed)	0	5	4	77	19	105
Riverine	4S (sand substrate exposed)	0	5	4	70	20	99
Riverine	4G (gravel/cobble substrate exposed)	0	6	3	59	21	89
Riverine	4R (rubble/boulders substrate exposed)	0	5	3	40	20	68
Douglas fir	1 (seedling tree)	0	10	16	79	51	156
Douglas fir	2S (sapling tree sparse)	0	9	16	98	54	177
Douglas fir	2P (sapling tree open)	0	9	16	98	54	177
Douglas fir	2M (sapling tree moderate)	0	9	14	89	52	164
Douglas fir	2D (sapling tree dense)	0	10	15	77	49	151
Douglas fir	3S (pole tree sparse)	0	9	16	104	54	183
Douglas fir	3P (pole tree open)	0	9	16	104	54	183
Douglas fir	3M (pole tree moderate)	0	9	15	93	51	168
Douglas fir	3D (pole tree dense)	0	10	15	90	45	160
Douglas fir	4S (small tree sparse)	0	9	16	107	54	186
Douglas fir	4P (small tree open)	0	9	16	106	54	185
Douglas fir	4M (small tree moderate)	0	9	14	98	49	170
Douglas fir	**4D (small tree dense)**	**169.61**	**10**	**16**	**94**	**45**	**165**
Douglas fir	5S (medium/large tree sparse)	0	9	16	109	51	185
Douglas fir	5P (medium/large tree open)	0	9	16	105	50	180
Douglas fir	5M (medium/large tree moderate)	0	9	14	94	46	163
Douglas fir	5D (medium large tree dense)	0	10	15	89	42	156
Douglas fir	6 (multi-layered tree stand)	0	10	14	81	38	143
Mixed chaparral	**1S (seedling, sparse cover)**	**3.36**	**8**	**19**	**110**	**58**	**195**
Mixed chaparral	**2S (young shrub sparse cover)**	**1.67**	**9**	**19**	**113**	**58**	**199**
Mixed chaparral	2P (young shrub open cover)	0	9	19	108	55	191
Mixed chaparral	**2M (young shrub moderate cover)**	**2.58**	**9**	**19**	**111**	**53**	**192**
Mixed chaparral	**2D (young shrub dense cover)**	**6.58**	**8**	**16**	**110**	**50**	**184**
Mixed chaparral	**3S (mature shrub sparse cover)**	**19.98**	**9**	**19**	**113**	**58**	**199**
Mixed chaparral	**3P (mature shrub open cover)**	**31.60**	**9**	**19**	**110**	**55**	**193**
Mixed chaparral	**3M (mature shrub moderate cover)**	**27.27**	**9**	**19**	**113**	**53**	**194**
Mixed chaparral	**3D (mature shrub dense cover)**	**141.35**	**8**	**16**	**114**	**50**	**188**
Mixed chaparral	4S (decadent shrub sparse cover)	0	9	19	113	57	198
Mixed chaparral	4P (decadent shrub open cover)	0	9	19	110	55	193
Mixed chaparral	4M (decadent shrub moderate cover)	0	9	19	112	53	193

Appendix E. CWHR predictions of species richness by habitat type and seral stage

Habitat Type	Seral Stage	Acreage	Amphibians	Reptiles	Birds	Mammals	Total
Mixed chaparral	4D (decadent shrub dense cover)	0	8	16	111	50	185
Habitat Type	**Seral Stage**	**Acreage**	**Amphibians**	**Reptiles**	**Birds**	**Mammals**	**Total**
Eucalyptus	1 (seedling tree)	0	11	21	143	51	226
Eucalyptus	2S (sapling tree sparse)	0	11	20	151	51	233
Eucalyptus	2P (sapling tree open)	0	11	21	146	51	229
Eucalyptus	2M (sapling tree moderate)	0	10	20	139	49	218
Eucalyptus	2D (sapling tree dense)	0	10	17	128	47	202
Eucalyptus	**3S (pole tree sparse)**	**0.55**	**11**	**21**	**152**	**51**	**235**
Eucalyptus	3P (pole tree open)	0	10	21	145	51	227
Eucalyptus	**3M (pole tree moderate)**	**0.50**	**10**	**19**	**141**	**48**	**218**
Eucalyptus	3D (pole tree dense)	0	9	17	131	46	203
Eucalyptus	4S (small tree sparse)	0	11	20	154	51	236
Eucalyptus	4P (small tree open)	0	11	21	148	51	231
Eucalyptus	4M (small tree moderate)	0	9	20	144	48	221
Eucalyptus	**4D (small tree dense)**	**1.58**	**9**	**17**	**134**	**46**	**206**
Eucalyptus	5S (medium/large tree sparse)	0	11	21	153	51	236
Eucalyptus	5P (medium/large tree open)	0	11	21	149	51	232
Eucalyptus	5M (medium/large tree moderate)	0	10	20	144	48	222
Eucalyptus	5D (medium large tree dense)	0	9	17	134	45	205
Montane hardwood-conifer	1 (seedling tree)	0	10	21	101	57	189
Montane hardwood-conifer	**2S (sapling tree sparse)**	**2.77**	**10**	**21**	**120**	**59**	**210**
Montane hardwood-conifer	**2P (sapling tree open)**	**4.12**	**10**	**21**	**122**	**59**	**212**
Montane hardwood-conifer	**2M (sapling tree moderate)**	**47.15**	**10**	**21**	**101**	**58**	**190**
Montane hardwood-conifer	2D (sapling tree dense)	0	10	17	89	55	171
Montane hardwood-conifer	3S (pole tree sparse)	0	10	21	122	60	213
Montane hardwood-conifer	**3P (pole tree open)**	**42.30**	**10**	**21**	**125**	**61**	**217**
Montane hardwood-conifer	**3M (pole tree moderate)**	**447.20**	**10**	**19**	**107**	**55**	**191**
Montane hardwood-conifer	**3D (pole tree dense)**	**20.38**	**10**	**16**	**96**	**54**	**176**
Montane hardwood-conifer	4S (small tree sparse)	0	10	21	126	61	218
Montane hardwood-conifer	4P (small tree open)	0	10	21	127	61	219
Montane hardwood-conifer	4M (small tree moderate)	0	10	19	112	57	198
Montane hardwood-conifer	**4D (small tree dense)**	**1672.88**	**10**	**15**	**102**	**53**	**180**
Montane hardwood-conifer	5S (medium/large tree sparse)	0	10	21	125	59	215
Montane hardwood-conifer	5P (medium/large tree open)	0	10	21	125	58	214
Montane hardwood-conifer	5M (medium/large tree moderate)	0	10	19	111	55	195

Appendix E. CWHR predictions of species richness by habitat type and seral stage

Habitat Type	Seral Stage	Acreage	Amphibians	Reptiles	Birds	Mammals	Total
Montane hardwood-conifer	5D (medium large tree dense)	0	10	15	101	51	177
Montane hardwood-conifer	**6 (multi-layered tree stand)**	**943.07**	**10**	**14**	**93**	**49**	**166**
Montane hardwood	**1 (seedling tree)**	**10.567**	**9**	**20**	**97**	**49**	**175**
Montane hardwood	**2S (sapling tree sparse)**	**32.94**	**9**	**19**	**117**	**49**	**194**
Montane hardwood	**2P (sapling tree open)**	**26.30**	**9**	**19**	**120**	**49**	**197**
Montane hardwood	**2M (sapling tree moderate)**	**115.20**	**9**	**20**	**106**	**46**	**181**
Montane hardwood	**2D (sapling tree dense)**	**2.53**	**9**	**16**	**91**	**43**	**159**
Montane hardwood	**3S (pole tree sparse)**	**17.47**	**9**	**19**	**121**	**47**	**196**
Montane hardwood	**3P (pole tree open)**	**159.49**	**9**	**19**	**122**	**49**	**199**
Montane hardwood	**3M (pole tree moderate)**	**581.54**	**9**	**18**	**119**	**46**	**192**
Montane hardwood	**3D (pole tree dense)**	**2363.61**	**9**	**15**	**116**	**43**	**183**
Montane hardwood	4S (small tree sparse)	0	9	19	122	48	198
Montane hardwood	**4P (small tree open)**	**1.07**	**9**	**19**	**125**	**49**	**202**
Montane hardwood	4M (small tree moderate)	0	9	18	122	45	194
Montane hardwood	4D (small tree dense)	0	9	14	117	41	181
Montane hardwood	5S (medium/large tree sparse)	0	9	19	120	47	195
Montane hardwood	5P (medium/large tree open)	0	9	19	122	48	198
Montane hardwood	5M (medium/large tree moderate)	0	9	18	121	43	191
Montane hardwood	5D (medium large tree dense)	0	9	13	116	39	177
Habitat Type	**Seral Stage**	**Acreage**	**Amphibians**	**Reptiles**	**Birds**	**Mammals**	**Total**
Deciduous Orchard	**1 (Seedling/Sapling Tree)**	**0.88**	**3**	**7**	**60**	**43**	**113**
Deciduous Orchard	**2 (Young Trees)**	**9.688**	**0**	**0**	**92**	**0**	**92**
Deciduous Orchard	**3 (Mature Trees)**	**0.42**	**0**	**0**	**94**	**0**	**94**
Pasture	**no stages**	**0.68**	**4**	**10**	**9**	**50**	**73**
Ponderosa Pine	1 (seedling tree)	0	9	20	96	53	178
Ponderosa Pine	2S (sapling tree sparse)	0	8	20	115	56	199
Ponderosa Pine	2P (sapling tree open)	0	9	20	115	56	200
Ponderosa Pine	2M (sapling tree moderate)	0	9	20	94	54	177
Ponderosa Pine	2D (sapling tree dense)	0	10	16	80	50	156
Ponderosa Pine	3S (pole tree sparse)	0	9	20	122	56	207
Ponderosa Pine	3P (pole tree open)	0	10	20	119	56	205
Ponderosa Pine	3M (pole tree moderate)	0	10	18	101	54	183
Ponderosa Pine	3D (pole tree dense)	0	10	15	89	49	163
Ponderosa Pine	4S (small tree sparse)	0	9	20	127	58	214
Ponderosa Pine	4P (small tree open)	0	10	20	126	58	214

Appendix E. CWHR predictions of species richness by habitat type and seral stage

Habitat Type	Seral Stage	Acreage	Amphibians	Reptiles	Birds	Mammals	Total
Ponderosa Pine	4M (small tree moderate)	0	10	18	105	52	185
Ponderosa Pine	**4D (small tree dense)**	**3.23**	**10**	**14**	**94**	**47**	**165**
Ponderosa Pine	5S (medium/large tree sparse)	0	9	20	124	55	208
Ponderosa Pine	5P (medium/large tree open)	0	10	20	120	56	206
Ponderosa Pine	5M (medium/large tree moderate)	0	10	18	102	50	180
Ponderosa Pine	5D (medium large tree dense)	0	10	13	92	44	159
Sierra Mixed Conifer	1 (seedling tree)	0	11	19	86	57	173
Sierra Mixed Conifer	2S (sapling tree sparse)	0	10	19	102	62	193
Sierra Mixed Conifer	2P (sapling tree open)	0	11	19	104	62	196
Sierra Mixed Conifer	2M (sapling tree moderate)	0	11	18	90	58	177
Sierra Mixed Conifer	2D (sapling tree dense)	0	11	14	78	55	158
Sierra Mixed Conifer	3S (pole tree sparse)	0	11	19	109	63	202
Sierra Mixed Conifer	3P (pole tree open)	0	11	19	110	63	203
Sierra Mixed Conifer	3M (pole tree moderate)	0	11	18	100	55	184
Sierra Mixed Conifer	3D (pole tree dense)	0	11	13	90	51	165
Sierra Mixed Conifer	4S (small tree sparse)	0	11	19	113	61	204
Sierra Mixed Conifer	4P (small tree open)	0	11	19	111	62	203
Sierra Mixed Conifer	**4M (small tree moderate)**	**1.52**	**11**	**18**	**105**	**55**	**189**
Sierra Mixed Conifer	**4D (small tree dense)**	**111.00**	**11**	**12**	**99**	**51**	**173**
Sierra Mixed Conifer	5S (medium/large tree sparse)	0	11	19	115	60	205
Sierra Mixed Conifer	5P (medium/large tree open)	0	11	19	112	58	200
Sierra Mixed Conifer	5M (medium/large tree moderate)	0	11	18	106	53	188
Sierra Mixed Conifer	5D (medium large tree dense)	0	11	12	99	50	172
Sierra Mixed Conifer	6 (multi-layered tree stand)	0	11	10	100	48	169
Habitat Type	**Seral Stage**	**Acreage**	**Amphibians**	**Reptiles**	**Birds**	**Mammals**	**Total**
Dry Land Grain Crops	**no stages**	**98.34**	**4**	**7**	**54**	**45**	**110**
Irrigated Hayfield	**no stages**	**3.31**	**0**	**0**	**120**	**45**	**165**
Montane Riparian	**1 (seedling tree)**	**4.13**	**12**	**19**	**110**	**64**	**205**
Montane Riparian	2S (sapling tree sparse)	0	12	19	128	65	224
Montane Riparian	2P (sapling tree open)	0	12	19	129	65	225
Montane Riparian	2M (sapling tree moderate)	0	12	19	114	64	209
Montane Riparian	2D (sapling tree dense)	0	12	18	97	63	190
Montane Riparian	3S (pole tree sparse)	0	12	19	130	66	227
Montane Riparian	**3P (pole tree open)**	**25.95**	**12**	**19**	**133**	**66**	**230**
Montane Riparian	**3M (pole tree moderate)**	**11.24**	**12**	**18**	**117**	**64**	**211**

Appendix E. CWHR predictions of species richness by habitat type and seral stage

Habitat Type	Seral Stage	Acreage	Amphibians	Reptiles	Birds	Mammals	Total
Montane Riparian	**3D (pole tree dense)**	**13.01**	**12**	**18**	**101**	**62**	**193**
Montane Riparian	4S (small tree sparse)	0	12	19	140	69	240
Montane Riparian	4P (small tree open)	0	12	19	143	67	241
Montane Riparian	4M (small tree moderate)	0	12	19	123	64	218
Montane Riparian	4D (small tree dense)	0	12	18	108	61	199
Montane Riparian	5S (medium/large tree sparse)	0	12	19	138	67	236
Montane Riparian	5P (medium/large tree open)	0	12	19	138	65	234
Montane Riparian	5M (medium/large tree moderate)	0	12	19	117	61	209
Montane Riparian	5D (medium large tree dense)	0	12	19	103	57	191
Montane Riparian	6 (multi-layered tree stand)	0	11	18	95	48	172
Valley Oak Woodland	**2S (sapling tree sparse)**	**4.07**	**10**	**20**	**112**	**51**	**193**
Valley Oak Woodland	2P (sapling tree open)	0	11	20	128	51	210
Valley Oak Woodland	2M (sapling tree moderate)	0	12	20	115	47	194
Valley Oak Woodland	2D (sapling tree dense)	0	11	18	89	47	165
Valley Oak Woodland	3S (pole tree sparse)	0	12	20	131	51	214
Valley Oak Woodland	3P (pole tree open)	0	12	20	129	52	213
Valley Oak Woodland	3M (pole tree moderate)	0	12	20	121	48	201
Valley Oak Woodland	3D (pole tree dense)	0	10	17	96	44	167
Valley Oak Woodland	4S (small tree sparse)	0	12	20	131	51	214
Valley Oak Woodland	**4P (small tree open)**	**3.58**	**12**	**20**	**128**	**51**	**211**
Valley Oak Woodland	4M (small tree moderate)	0	12	20	119	47	198
Valley Oak Woodland	4D (small tree dense)	0	10	17	97	42	166
Valley Oak Woodland	5S (medium/large tree sparse)	0	12	20	129	49	210
Valley Oak Woodland	**5P (medium/large tree open)**	**2.18**	**12**	**20**	**127**	**49**	**208**
Valley Oak Woodland	5M (medium/large tree moderate)	0	12	20	116	43	191
Valley Oak Woodland	5D (medium large tree dense)	0	10	17	97	39	163

Appendix F

Predicted Wildlife Species Occurrence and WHR Average Habitat Suitability Values by Habitat Type

Appendix F. Predicted wildlife species occurrence and CWHR average habitat suitibility values by habitat type

COMMON NAME	SCIENTIFIC NAME	Annual grassland	Barren	Blue oak woodland	Blue oak/ foothill pine	Deciduous orchard	Douglas fir	Dryland grain	Eucaplyptus	Evergreen orchard	Freshwater emergent wetland	Irrigated grain	Irrigated hayfield	Irrigated row & field crop	Lacustrine	Mixed chaparral	Montane hardwood	Montane/ hardwood conifer	Montane riparian	Pasture	Perrenial grassland	Ponderosa Pine	Riverine	Sierran mixed conifer	Urban/ disturbed	Valley/ foothill riparian	Valley oak woodland	Vineyard
Amphibians																												
bullfrog	*Rana catesbeiana*	0.66		0.54	0.66		0.07	0.33	0.29		0.86	0.33		0.33	0.53	0.63	0.66	0.66	0.66	0.89	0.80	0.61	0.53	0.62	0.60	0.78	0.66	0.33
California newt	*Taricha torosa*	0.33		0.72	0.73		0.33		0.41		1.00				0.20	0.66	0.33		0.66			0.33	0.19	0.33		0.66	0.72	
California slender salamander	*Batachoseps attenuatus*	0.33		0.78	0.66		0.96		0.45							0.33			0.66		0.33			0.33	0.33	1.00	0.82	
California tiger salamander	*Ambystoma tigrinum*	1.42		0.37	0.47				0.45		0.39				0.05						0.51					0.23	0.39	
ensatina	*Ensatina eschschltzi*			0.43	0.45				0.33							0.33	0.49	0.50				0.49				0.78	0.49	
foothill yellow-legged frog	*Rana boylei*	0.33		0.33	0.33		0.66		0.33							0.17	0.33	0.33	0.33			0.22	0.40			0.61	0.33	
long-toed salamander	*Ambystoma macrodactylum*			0.33			0.33				0.33				0.16		0.56	0.57	0.33			0.56				0.33	0.33	
mountain yellow-legged frog	*Rana muscosa*						0.33				0.66				0.13		0.33	0.60	0.33			0.45	0.66					
Pacific chorus frog	*Hyla regilla*			0.17	0.17				0.31							0.43	0.29						0.32			0.52	0.17	
red-legged frog	*Rana aurora*	0.66		0.66	0.66		0.64		0.33		1.00				0.09	0.33	0.33	0.33	0.33		0.66	0.33	0.16			0.33	0.31	
rough-skinned newt	*Taricha granulosa*	0.33		0.64	0.64		0.47		0.33		0.33				0.21		0.37	0.59	0.68	0.33	0.33	0.27	0.25			0.82	0.64	
western spadefoot	*Scaphiopus hammondi*	0.83		0.43	0.25	0.11		0.33	0.19	0.11	0.89			0.33	0.26	0.33					0.50		0.21				0.43	0.33
western toad	*Bufo boreas*	0.66		0.56	0.56	0.33	0.33	0.33	0.54	0.33	0.66	0.33		0.33	0.62	0.40	0.33	0.56	0.55	0.66	0.66	0.33	0.49		0.33	0.65	0.56	0.33
Reptiles																												
California mountain kingsnake	*Lampropeltis zonata*	0.33		0.39	0.39		0.53		0.31							0.48	0.53	0.52	0.87			0.52		0.53		0.52	0.33	
coachwhip	*Masticophis*	0.33		0.17	0.17				0.35							0.10				0.33	0.33					0.17	0.17	
Coast horned lizard	*Phrynosoma coronatum*	0.25		0.39	0.39			0.33	0.35					0.33		0.57		0.18			0.41	0.19				0.37	0.39	0.33
common garter snake	*Thamnophis sirtalis*	1.00		0.66	0.66	0.11	0.66	0.33	0.33	0.11	1.00	0.66		0.66	0.12	0.85	0.58	0.33	0.66	0.66	0.66	0.66		0.55		1.00	0.66	0.33
common kingsnake	*Lampropeltis getulus*	0.66		0.66	0.66	0.66	0.26	0.66	0.66	0.66	0.66	0.33		0.33		0.91	0.33	0.33	0.33	0.66	1.00	0.33		0.33	0.33	1.00	0.66	0.66
Gilberts skink	*Eumeces gilberti*	0.33		0.92	0.80	0.11			0.33	0.11				0.33		0.77	0.25	0.24	0.74	0.33		0.27		0.50		0.92	0.92	0.33
gopher snake	*Pituophis melanoleucus*	1.04		0.78	0.78	0.29	0.40	0.66	0.51	0.37	0.34	0.33		0.33		0.78	0.43	0.44	0.46	1.00	1.13	0.52		0.48	0.33	0.85	0.79	0.66
night snake	*Hypsigiena torquata*	0.66		0.66	0.66				0.33							0.66	0.33	0.33	0.33		0.66	0.33		0.24		0.66	0.66	
northern alligator lizard	*Gerrhonotus coeruleus*	0.33		0.33			0.92		0.56								0.85	0.83	0.66		0.33	0.60		0.83			0.33	
racer	*Coluber constrictor*	1.00		0.70	0.52	0.11	0.48	0.33	0.43	0.33	0.66			0.33		0.43	0.37	0.42	0.50	0.66	0.66	0.43		0.42		0.54	0.70	0.33
ringneck snake	*Diadophis punctatus*	0.33		0.43	0.57		0.33		0.43		0.33					0.74	0.25	0.24	0.81	0.33	0.33	0.25		0.24	0.33	0.53	0.43	
rubber boa	*Charina bottae*						0.81		0.33								0.80	0.81	0.87			0.80		0.81		0.25		
sagebrush lizard	*Sceloporus graciosus*						0.49		0.18							0.34	0.41	0.38				0.40		0.34				
sharp-tailed snake	*Contia tenuis*			0.43	0.72		0.40		0.49							0.72	0.50	0.44	1.00			0.33		0.33		0.72	0.43	
southern alligator lizard	*Gerrhonotus multicarinatus*	0.33		0.92	0.92	0.66	0.53	0.33	0.58	0.22		0.33		0.33		0.92	0.33	0.33	0.91	0.33	0.66	0.52		0.51	0.33	0.96	0.92	0.66
western aquatic garter snake	*Thamnophis couchi*	0.34		0.55	0.55				0.33		1.04				0.65	0.57	0.52	0.55	1.00		0.55	0.55	0.63			1.00	0.55	
western fence lizard	*Sceloporus occidentalis*	0.34		0.92	0.92	0.37	0.68	0.33	0.50	0.37		0.33				0.74	0.50	0.92	0.53	0.33	0.34	0.76		0.72	0.33	0.92	0.92	0.60
western pond turtle	*Clemmys marmorata*	0.66		0.88	0.88				0.33		0.83				0.59	0.33	0.47	0.46	0.66	0.11	0.33	0.33	0.51	0.31	0.11	0.90	0.88	
western rattle snake	*Crotalis viridis*	0.66	0.33	1.00	1.00		0.55		0.66		0.33					1.00	0.58	0.57	0.66	0.33	0.33	0.72		0.57	0.33	0.94	1.00	
western skink	*Eumeces skiltonianus*	0.33		0.92	0.92	0.11	0.51		0.50	0.11				0.33		0.51	0.58	0.57	0.70	0.33	0.66	0.39		0.44		0.92	0.92	0.66
western terrestrial garter snake	*Thamnophis elegans*	0.58		0.92	0.92		0.76		0.33		1.00				0.13	0.66	0.58	0.57	0.98		0.58	0.58	0.34	0.57		0.86	0.33	
western whiptail	*Cnemidophorus tigris*	0.33		0.33	0.33				0.49							0.58	0.29	0.28	0.33					0.26		0.33		

Appendix F. Predicted wildlife species occurrence and CWHR average habitat suitibility values by habitat type (continued)

COMMON NAME	SCIENTIFIC NAME	Annual grassland	Barren	Blue oak/ woodland	Blue oak/ foothill pine	Deciduous orchard	Douglas fir	Dryland grain	Eucalyptus	Evergreen orchard	Freshwater emergent wetland	Irrigated grain	Irrigated hayfield	Irrigated row & field crop	Lacustrine	Mixed chaparral	Montane hardwood	Montane/ hardwood conifer	Montane riparian	Pasture	Perrenial grassland	Ponderosa Pine	Riverine	Sierran mixed conifer	Urban/ disturbed	Valley/ foothill riparian	Valley oak woodland	Vineyard
Birds																												
acorn woodpecker	*Melanerpes formicivorus*			0.68	0.68		0.05		0.19								0.63	0.67	0.57			0.54		0.25	1.00	0.52	0.68	
American avocet	*Recurvirostra americana*		1.00								0.50	0.66	0.66		0.26								0.13					
American bittern	*Botaurus lentiginosus*										0.62				0.03								0.03					
American coot	*Fulica americana*	0.22									0.92	1.00	0.67		0.39						0.22		0.39		1.00			
American crow	*Corvus brachyrhynchos*	0.33		0.61	0.61	0.56	0.22	0.33	0.54	0.56		0.33	0.33	0.33	0.11		0.24	0.09	0.07		0.33	0.10	0.11	0.09	1.00	0.43	0.61	0.33
American dipper	*Cinculus mexicanus*		1.00												0.12				0.89				0.58		1.00	0.33		
American goldfinch	*Carduelis tristis*	0.19		0.43	0.43	0.48	0.13		0.39				0.22			0.18	0.12	0.12	0.12		0.19				1.00	0.77	0.43	
American kestrel	*Falco sparverius*	0.55	0.44	0.59	0.59	0.48	0.34	0.67	0.41	0.48	0.26	0.67	0.67	0.67		0.22	0.59	0.60	0.60		0.33	0.59		0.60	1.00	0.51	0.59	0.67
American pipit	*Anthus rubescens*	0.40	0.67					0.67	0.09		0.11		0.67		0.16						0.40		0.16		0.22	0.04		
American robin	*Turdus migratorius*	0.25		0.53	0.53	0.51	0.58		0.32			0.11	0.22			0.17	0.68	0.60	0.58		0.25	0.61		0.63	1.00	0.63	0.53	
American white pelican	*Pelecanus erythrorhynchos*		0.67												0.26								0.15					
American widgeon	*Anas americana*	0.72						0.78			0.67	0.78	0.44	0.44	0.24						0.72		0.24		0.44			
Anna's hummingbird	*Calypte anna*			0.67	0.67	0.44	0.26		0.64	0.44						0.95	0.45	0.35	0.35			0.37		0.34	1.00	0.68	0.67	0.55
ash-throated flycatcher	*Myiarchus cinerascens*			0.65	0.65				0.26							0.57	0.72	0.52				0.16				0.65	0.65	
bald eagle	*Haliaeetus leucocephalus*	0.11	0.11	0.20	0.20		0.19		0.08		0.22				0.23	0.11	0.32	0.31	0.25		0.11	0.43	0.23	0.68		0.32	0.20	
band-tailed pigeon	*Columba fasciata*			0.38	0.38		0.52	0.33		0.41		0.33				0.14	0.60	0.62	0.60			0.47		0.60	1.00	0.31	0.38	0.33
bank swallow	*Riparia riparia*	1.00	0.78			0.30		0.22			0.33	0.89	0.89	0.89	0.29	0.11			0.89		1.00		0.29		0.11	0.95		
barn owl	*Tyto alba*	0.33	0.67	0.71	0.71	0.67	0.17	0.67	0.58	0.67	0.28	0.67		0.67		0.81	0.71	0.67	0.67		0.33	0.48		0.15	1.00	0.84	0.71	0.67
barn swallow	*Hirundo rustica*	1.00		0.76	0.76	0.30	0.61	0.33	0.33	0.30	1.00	0.33	0.33	0.33	0.43	0.65	0.62	0.60	0.67		1.00	0.76	0.43	0.60	0.33	0.58	0.76	0.33
Barrow's goldeneye	*Bucephala islandica*														0.16								0.16					
belted kingfisher	*Ceryle alcyon*	0.67									0.19				0.22				1.00				0.22			1.00		
Bewick's wren	*Thryomanes bewickii*			0.82	0.82	0.15	0.26		0.33							0.84	0.27	0.15	0.82			0.16			1.00	0.82	0.82	
black phoebe	*Sayornis nigricans*	0.61	0.33	0.33	0.33	0.44			0.33	0.44	0.53	0.44	0.44	0.44	0.29	0.33	0.33	0.33	0.89		0.53	0.33	0.29		1.00	0.88		0.44
black swift	*Cypesloides niger*	0.11	1.00	0.33	0.33		1.00		0.11						0.11	0.11	0.11	1.00	1.00		0.11	0.11	0.47	1.00	0.22	0.11	0.33	
black tern	*Chlidonias niger*										0.83	1.00	0.44		0.16													
black-backed woodpecker	*Picoides arcticus*																							0.17				
black-chinned hummingbird	*Archilochus alexandri*			0.55	0.55	0.22			0.40							0.21		0.15							1.00	0.67	0.55	
black-chinned sparrow	*Spizella atrogularis*															0.55								0.09				
black-crowned night heron	*Nycticorax nycticorax*			0.46	0.46				0.19		0.86				0.24	0.07	0.17	0.17	0.39				0.24		0.55	0.39	0.54	
black-headed grosbeak	*Pheucticus melanocephalus*			0.65	0.65	0.37	0.23		0.30							0.34	0.71	0.67	0.67			0.36		0.38	1.00	0.68	0.65	
black-necked stilt	*Himantopus mexicanus*		1.00								0.48	0.66	0.66		0.19								0.13					
black-throated gray warbler	*Dendroica nigrescens*			0.52	0.83	0.15	0.21		0.23							0.20	0.83	0.67	0.39			0.83		0.52	0.22	0.55	0.52	
black-throated sparrow	*Amphispiza bilineata*															0.08												
blue grosbeak	*Guiraca caerulea*	0.39				0.37			0.05			0.55	0.55	0.55					0.41							0.77		
blue grouse	*Dendragapus obscurus*	0.44					0.82										0.17	0.55	0.59		0.44	0.22		0.67				
blue-gray knatcatcher	*Polioptila caerulea*			0.67	0.75				0.39							0.41	0.47					0.01				0.17	0.61	
blue-winged teal	*Anas discors*	0.44						0.33			0.61	0.33			0.19						0.41							
Brewer's blackbird	*Euphagus cyanocephalus*	0.28		0.49	0.49	0.89	0.46	0.66	0.60		0.33	0.66	0.66	0.66	0.07		0.49	0.46	0.43		0.28	0.49	0.07	0.50	1.00	0.73	0.49	1.00
brown creeper	*Certhia americana*			0.10	0.10		0.46		0.14								0.18	0.43	0.32			0.51		0.54	1.00	0.17	0.10	
brown-headed cowbird	*Molothus ater*	0.55		0.40	0.55	0.52	0.37	0.33	0.34		0.75	0.33	0.33			0.66	0.38	0.37	0.63		0.55	0.38		0.39	1.00	0.61	0.40	
bufflehead	*Bucephala albeola*										0.11				0.53				0.06							0.21		
burrowing owl	*Athene cunicularia*	0.92		0.22	0.22				0.17							0.25				1.00	0.92	0.06			1.00	0.04	0.22	
bushtit	*Psaltriparus minimus*			0.80	0.80				0.33							0.46	0.48	0.49	0.49			0.21		0.33	1.00	0.80	0.80	
California gull	*Larus californicus*	0.34	0.67								0.44	0.67	0.67	0.67	0.68						0.34		0.42		0.67			
California quail	*Callipepla californica*	0.69		0.93	0.93	0.62	0.62		0.34	0.66	0.77	0.77				0.75	0.63	0.62	0.62		0.69	0.63		0.63	0.89	0.93	0.93	0.77
California thrasher	*Toxostoma redivivum*			0.28	0.11				0.08							0.71	0.10	0.07	0.24						0.66	0.20	0.11	
California towhee	*Pipilo crissalis*			0.51	0.56	0.29			0.33							0.49	0.52	0.19	0.18			0.19			1.00	0.53	0.38	
calliope hummingbird	*Stellula calliope*			0.22	0.22	0.18	0.60		0.22							0.21	0.44	0.51	0.67			0.38		0.52	1.00	0.17	0.26	
Canada goose	*Branta canadensis*	0.78									1.00	0.67	0.78		0.18						0.78		0.12		0.22			
canvasback	*Aythya valisineria*										0.71				0.34								0.17					
canyon wren	*Catherpes mexicanus*		1.00	0.66												0.66			0.83							1.00		
Cassin's finch	*Carpodacus cassinii*						0.16												0.24			0.17		0.43				
cattle egret	*Bubulcus ibis*	0.67		0.32	0.32				0.14		0.44	0.67	0.67	0.67	0.03						0.67		0.03		0.44	0.31	0.32	
cedar waxwing	*Bombycilla cedrorum*			0.40	0.46	0.29	0.44		0.56	0.29						0.26	0.21	0.21	0.34			0.21		0.21	1.00	0.52	0.46	0.67

Appendix F. Predicted wildlife species occurrence and CWHR average habitat suitibility values by habitat type (continued)

COMMON NAME	SCIENTIFIC NAME	Annual grassland	Barren	Blue oak woodland	Blue oak/ foothill pine	Deciduous orchard	Douglas fir	Dryland grain	Eucaplyptus	Evergreen orchard	Freshwater emergent wetland	Irrigated grain	Irrigated hayfield	Irrigated row & field crop	Lacustrine	Mixed chaparral	Montane hardwood	Montane/ hardwood conifer	Montane riparian	Pasture	Perrenial grassland	Ponderosa Pine	Riverine	Sierran mixed conifer	Urban/ disturbed	Valley/ foothill riparian	Valley oak woodland	Vineyard
Birds																												
chestnut-backed chickadee	*Parus refescens*			0.38	0.38		0.74		0.30							0.14	0.38	0.38	0.51			0.38		0.19	1.00	0.34	0.38	
chipping sparrow	*Spizella passerina*	0.15		0.59	0.73	0.59	0.42		0.33							0.11	0.68	0.55	0.36		0.15	0.59		0.65		0.19	0.59	
cinnamon teal	*Anas cyanoptera*	0.08									0.94	0.33	0.33		0.16						0.08		0.21			0.22		
Clark's grebe	*Aechmophorus clarkii*										0.75				0.21								0.16					
cliff swallow	*Hirundo pyrrhonota*	0.80		0.72	0.72	0.51		0.66	0.34		0.80	0.66	0.77	0.77	0.40	0.68			0.61		0.80	0.43	0.37	0.29	1.00	0.96		0.33
common goldeneye	*Bucephala clangula*														0.28								0.28			0.41		
common loon	*Gavia immer*														0.03													
common merganser	*Mergus merganser*										0.55				0.34				0.26				0.33		0.67	0.51		
common moorhead	*Gallinula chloropus*										0.94	0.78			0.09								0.04		1.00			
common nighthawk	*Chordeiles minor*	0.44	1.00	0.51	0.51		0.42		0.10		0.33	0.33	0.33	0.33	0.33	0.28		0.75			0.44	0.51	0.34	0.64	0.89	0.24	0.53	
common poorwill	*Phalaenoptilis nuttallii*	0.17	1.00	0.74	0.74	0.11	0.22		0.22			0.11	0.11	0.11	0.22	0.71	0.50	0.49			0.21	0.25	0.22	0.22			0.74	
common raven	*Corvus corax*	0.33	0.89	0.86	0.86	0.22	0.85	0.33	0.33		0.22				0.05	0.76	0.84	0.85	0.85		0.33	0.84	0.09	0.85		0.73	0.84	
common snipe	*Gallinago gallinago*										0.83	0.44			0.05								0.05			0.04		
common yellowthroat	*Geothlypis trichas*	0.72							0.22		0.87								0.34		0.76	0.10				0.60		
Cooper's hawk	*Accipiter cooperii*	0.22		0.70	0.70	0.55	0.31		0.36	0.55		0.33	0.33			0.21	0.55	0.67	0.72		0.19	0.47		0.48	1.00	0.53	0.70	0.33
dark-eyed junco	*Junco hyemalis*			0.79	0.79	0.40	0.79		0.66				0.44			0.39	0.79	0.77	0.74			0.79		0.76	0.78	0.79	0.79	
double-crested cormorant	*Phalacrocorax auritus*		0.67								0.19				0.40								0.20			0.28		
downy woodpecker	*Picoides pubescens*	0.11		0.56	0.29	0.89	0.38		0.30							0.16	0.45	0.47	0.73		0.12	0.37		0.39	1.00	0.74	0.56	
dunlin	*Calidris alpina*		0.67								0.49	0.44	0.67		0.27								0.22					
dusky flycatcher	*Empidonax oberholseri*			0.21	0.21		0.32		0.17							0.12		0.75	0.70			0.78		0.75		0.21	0.21	
eared grebe	*Podiceps nigricollis*										1.00				0.25								0.16					
eurasian widgeon	*Anas penelope*	0.50									0.50				0.36						0.50		0.35		0.22			
European starling	*Sturnus vulgaris*	0.26		0.76	0.76	0.56	0.24	0.33	0.69	0.67	0.08	0.33	0.33	0.33		0.25	0.47	0.48	0.50		0.26	0.45		0.24	1.00	0.68	0.76	
evening grosbeak	*Coccothraustes vespertinus*			0.18	0.18	0.15	0.28		0.16							0.10	0.26	0.27	0.32			0.18		0.51	0.44	0.18	0.18	
ferruginous hawk	*Buteo regalis*	0.44	0.44	0.33	0.33				0.21		0.11									0.67	0.44					0.17	0.33	
flammulated owl	*Otus flammeolus*						0.72										0.70	0.72	0.47			0.70		0.72				
Forester's tern	*Sterna forsteri*		0.67								0.33				0.40								0.32			0.44		
fox sparrow	*Passerella iliaca*			0.28	0.28	0.37	0.24		0.22							0.48	0.40	0.47	0.48			0.43		0.68	0.44	0.34	0.28	
glaucous-winged gul	*Larus glaucescens*		0.67									0.22	0.22	0.22														
golden eagle	*Aquila chrysaetos*	0.55	1.00	0.92	0.92		0.52		0.37		0.26					0.52	0.92	0.93	0.87	0.56	0.36	0.92		0.93	0.11	0.44	0.92	
golden-crowned kinglet	*Regulus satrapa*			0.10	0.08	0.22	0.70		0.16							0.10	0.08	0.70	0.15			0.60		0.70	0.22	0.16	0.08	
golden-crowned sparrow	*Zonotrichia atricapilla*	0.04		0.36	0.34	0.29	0.26	0.11	0.22				0.22			0.34	0.22	0.11	0.11		0.04	0.12		0.11	0.67	0.36	0.27	
great blue heron	*Ardea herodias*	0.33		0.43	0.43		0.17	0.67	0.27		0.33	0.67	0.33	0.67	0.19		0.16	0.17	0.26		0.33	0.23	0.36	0.34	1.00	0.36	0.40	
great egret	*Casmerodius albus*	0.67		0.45	0.45		0.10	0.67	0.27		0.67	0.67	0.67	0.67	0.39			0.10	0.15		0.67		0.32		0.78	0.47	0.45	0.33
great horned owl	*Bubo virginianus*	0.33	1.00	0.73	0.73	0.26	0.49		0.47	0.26	0.33	0.33	0.33			0.06	0.73	0.72	0.74		0.33	0.73		0.69	1.00	0.70	0.73	0.33
greater roadrunner	*Geococcyx californianus*			0.27	0.27				0.33	0.22						0.45									0.33		0.27	
greater scaup	*Aythya marila*														0.22	0.05												
greater white-fronted goose	*Anser albifrons*	0.58									0.67	0.67	0.67	0.44	0.18						0.58		0.10					
greater yellowlegs	*Tringa melanoleuca*										0.44	0.44	0.22		0.28								0.40			0.22		
green-backed heron	*Butorides striatus*			0.25	0.25	0.15	0.15		0.72		0.71				0.40		0.17	0.17	0.17			0.14	0.40	0.22	1.00	0.76	0.25	
green-tailed towhee	*Pipilo chlorurus*						0.11										0.31	0.30	0.28			0.27		0.46				
green-winged teal	*Anas crecca*	0.72									0.72	0.33	0.33		0.28				0.17		0.72		0.27		0.22			
hairy woodpecker	*Picoides villosus*			0.51	0.31		0.53		0.19							0.18	0.60	0.62	0.66			0.64		0.70		0.50	0.51	
Hammond's flycatcher	*Empidonax hammondii*			0.10	0.13		0.31		0.22								0.16	0.31	0.28			0.19		0.28	1.00	0.05	0.05	
hermit thrush	*Catharus guttatus*			0.48	0.48	0.22	0.49		0.22							0.36	0.66	0.68	0.50			0.40		0.70	0.44	0.49	0.48	
hermit warbler	*Dendroica coccidentalis*			0.27	0.27		0.65		0.22								0.34	0.56	0.22			0.63		0.65	0.44	0.27	0.27	
herring gull	*Larus argentatus*		0.55									0.44	0.44	0.44	0.33								0.33					
hooded merganser	*Lophodytes cucullatus*										0.41				0.30								0.25			0.67		
hooded oriole	*Icterus cucullatus*					0.44			0.30	0.40															1.00	0.21		
horned lark	*Eremophila alpestris*	0.92	0.67	0.29	0.32	1.00			0.19				0.67								0.92					0.10	0.29	
house finch	*Carpodacus mexicanus*	0.22		0.73	0.73	0.63	0.11	0.55	0.61			0.55	0.55			0.26	0.32	0.16	0.11		0.28	0.32		0.13	1.00	0.71	0.73	1.00
house sparrow	*Passer domesticus*			0.23	0.27	0.33			0.62			0.22	0.67												1.00	0.25	0.25	
house wren	*Troglodytes aedon*			0.91	0.83	0.59			0.33							0.50	0.60	0.56	0.95						1.00	0.94	0.88	
Hutton's vireo	*Vireo huttoni*			0.82	0.82	0.44	0.29		0.32							0.27	0.61	0.62	0.61			0.21		0.24	0.78	0.83	0.82	
killdeer	*Charadrius vociferus*	0.31	1.00	0.17	0.17						0.36	1.00	1.00	1.00	0.47						0.31		0.47		1.00	0.13		

Appendix F. Predicted wildlife species occurrence and CWHR average habitat suitibility values by habitat type (continued)

COMMON NAME	SCIENTIFIC NAME	Annual grassland	Barren	Blue oak woodland	Blue oak/ foothill pine	Deciduous orchard	Douglas fir	Dryland grain	Eucaplyptus	Evergreen orchard	Freshwater emergent wetland	Irrigated grain	Irrigated hayfield	Irrigated row & field crop	Lacustrine	Mixed chaparral	Montane hardwood	Montane/ hardwood conifer	Montane riparian	Pasture	Perrenial grassland	Ponderosa Pine	Riverine	Sierran mixed conifer	Urban/ disturbed	Valley/ foothill riparian	Valley oak woodland	Vineyard
Birds																												
lapland longspur	*Calcarius lapponicus*	0.25				0.22							0.22								0.25							
lark sparrow	*Chondestes grammacus*	0.75		0.65	0.65	0.62	0.55	0.55	0.25				0.66			0.36	0.39	0.13			0.75	0.10				0.27	0.67	
Lawrence's goldfinch	*Carduelis lawrencei*	0.25		0.49	0.49	0.37			0.39				0.22			0.42	0.51	0.22	0.23			0.16			0.44	0.59	0.49	
lazuli bunting	*Passerina amoena*			0.64	0.64	0.29	0.12		0.22							0.50	0.41	0.17	0.54			0.12		0.12		0.73	0.52	
least bittern	*Ixobrychus exilis*										0.50				0.03								0.03					
least sandpiper	*Calidris minutilla*		0.67								0.61	0.67	0.67		0.25								0.25					
lesser goldfinch	*Carduelis psaltria*	0.19		0.62	0.64	0.44	0.21	0.22	0.39				0.44			0.40	0.53	0.23	0.23		0.19	0.25		0.24	1.00	0.62	0.54	0.55
lesser nighthawk	*Chordeiles acutipennis*	0.33	1.00	0.51	0.51	0.33			0.22	0.33	0.33	0.33	0.33	0.33	0.27						0.33		0.27			0.36	0.51	0.11
lesser scaup	*Aythya affinis*	0.15						0.22			0.48	0.22	0.22		0.40						0.15		0.39					
Lewis' woodpecker	*Melanerpes lewis*	0.33		0.47	0.47	0.40	0.26		0.21							0.21	0.59	0.61	0.61		0.33	0.59		0.61		0.26	0.59	
Lincoln's sparrow	*Melospiza lincolnii*	0.22		0.06	0.06	0.22	0.06		0.22		0.22	0.22		0.22			0.06	0.06	0.30		0.22	0.06		0.33	0.22	0.12	0.06	
loggerhead shrike	*Lanius ludovicianus*	0.47	0.22	0.67	0.67	0.44		0.44	0.41				0.44			0.23	0.12	0.12	0.15		0.47	0.14			0.44	0.27	0.67	0.22
long-billed curlew	*Numenius americanus*	0.61	0.67					0.67			0.61		1.00		0.19						0.61		0.19			0.04		
long-billed dowitcher	*Limnodromus scolopaceus*		0.67								0.47	0.67	0.67		0.27								0.15					
long-eared owl	*Asio otus*	0.33		0.59	0.59				0.19							0.45	0.39	0.43	0.60	0.33	0.33	0.43		0.43		0.59	0.59	
MacGillivray's warbler	*Oporonis tolmiei*			0.22			0.29		0.22							0.10	0.07	0.26	0.46					0.20	0.11	0.37		
mallard	*Anas platyrhynchos*	0.89							0.33		1.00	1.00	1.00		0.53				0.33		0.89		0.49		1.00	0.56		
marsh wren	*Cistothorus palustris*										0.67								0.06							0.22		
merlin	*Falco columbarius*	0.22	0.11	0.32	0.32	0.22	0.23		0.27		0.22	0.55	0.55	0.55	0.07	0.18	0.17	0.17	0.23		0.22	0.21	0.07	0.23	0.55	0.35	0.32	0.44
mew gull	*Larus canus*		0.67									0.11	0.11		0.22								0.22		0.11			
mountain bluebird	*Sialia currucoides*	0.25		0.15	0.15			0.22	0.06			0.22	0.33						0.33		0.25	0.23		0.21		0.08	0.12	
mountain chickadee	*Parus gambeli*			0.16	0.16	0.15	0.47									0.05	0.21	0.52	0.43			0.68		0.82	1.00	0.21	0.16	
mountain quail	*Oreortyx pictus*	0.33			0.70		0.54									0.52	0.88	0.87	0.87		0.33	0.88		0.87		0.63		
mourning dove	*Zenaida macroura*	0.42		0.65	0.70	0.70	0.43	0.33	0.49	0.56		0.33	0.33			0.36	0.75	0.69	0.64		0.36	0.69		0.44	1.00	0.64	0.65	1.00
Nashville warbler	*Vermivora ruficapilla*			0.29	0.33	0.15	0.32		0.23							0.36	0.67	0.65	0.65			0.67		0.74	0.67	0.32	0.28	
northen rough-winged swallow	*Stelgidopteryx serropennis*	0.33	0.78	0.92	0.92			0.22	0.33		0.33	0.22	0.33	0.33	0.33	0.33	0.92	0.87	0.92		0.33	0.92	0.61		1.00	0.92	0.92	0.11
northern flicker	*Colaptes auratus*	0.17		0.67	0.51	0.59	0.37		0.47	0.52			0.33			0.31	0.67	0.69	0.69		0.33	0.61		0.65	1.00	0.64	0.67	0.33
northern goshawk	*Accipiter gentilis*			0.10	0.16		0.40		0.16							0.11	0.51	0.54	0.54			0.51		0.55		0.26	0.16	
northern harrier	*Circus cyaneus*	0.94	0.22	0.10	0.12	0.55	0.02	1.00	0.15		0.94	1.00	1.00		0.08	0.22	0.02	0.02	0.02		0.94	0.02	0.08	0.02	0.44	0.10	0.10	0.44
northern mockingbird	*Mimus polyglottos*	0.22		0.58	0.41	0.40			0.49	0.89			0.22	0.22		0.78									1.00	0.22	0.58	0.67
northern oriole	*Icterus galbula*			0.53	0.53	0.59			0.51								0.41	0.26	0.39			0.16			1.00	0.53	0.53	
northern pintai	*Anas acuta*	0.89						1.00			0.78	1.00	1.00		0.33						0.89		0.02		0.44			
northern pygmy-ow	*Glaucidium gnoma*			0.66	0.66	0.30	0.68		0.27			0.33				0.19	0.66	0.68	0.68			0.66		0.68	1.00	0.66	0.66	
northern saw-whet ow	*Aegolius acadicus*			0.65	0.65	0.07	0.67		0.25				0.11			0.10	0.65	0.67	0.65			0.65		0.67	0.33	0.65	0.65	
northern shoveler	*Anas clypeata*	0.62									0.94	0.22	0.22		0.25						0.62							
northern shrike	*Lanius excubitor*							0.44				0.44	0.55			0.05		0.07	0.07		0.55	0.06				0.06		
Nuttall's woodpecker	*Picoides nuttallii*			0.83	0.83				0.29							0.17	0.54	0.55	0.73			0.38		0.39	0.55	0.76	0.83	
oak titmouse	*Parus inornatus*			0.79	0.79	0.40			0.30							0.45	0.01	0.62							1.00	0.61	0.74	
olive-sided flycatcher	*Contopus borealis*			0.16			0.58		0.29							0.29	0.30	0.64	0.31			0.30		0.67				
orange-crowned warbler	*Vermivora celata*			0.82	0.82	0.29	0.14		0.33							0.55	0.53	0.53	0.23			0.34		0.32	0.67	0.86	0.82	
osprey	*Pandion haliaetus*	0.11	0.11	0.17	0.17		0.50		0.10		0.33	0.11	0.11		0.23	0.11	0.36	0.48	0.57		0.11	0.60	0.23	0.62		1.00	0.17	
Pacific-slope flycatcher	*Empidonax difficilis*			0.50	0.58	0.44	0.63		0.22							0.10	0.61	0.63	0.72					0.63	1.00	0.60	0.61	
peregrine falcon	*Falco peregrinus*	1.00	1.00	0.89	0.89		0.89		0.33		0.67	0.44	0.44		0.33	0.56	0.90	0.90	0.90		1.04	0.61	0.33	0.91	1.00	0.91	0.91	
phainopepla	*phainopepla nitens*			0.39	0.50				0.22							0.22	0.35					0.90			1.00	0.32	0.39	0.44
pied-billed grebe	*Podilymbus podiceps*										0.94				0.25								0.14					
pileated woodpecker	*Dryocopus pileatus*				0.20		0.37										0.20	0.38	0.13			0.34		0.38				
pine siskin	*Carduelis pinus*	0.19		0.38	0.34	0.22	0.60	0.11	0.36				0.22			0.01	0.26	0.22	0.25		0.19	0.27		0.41	0.78	0.42	0.38	
prairie falcon	*Falco mexicanus*	1.13	0.33	0.89	0.89	0.26	0.87	0.33	0.36		0.10	0.11	0.11			0.62	0.87	0.87	0.78		1.13	0.87		0.87	0.33	0.81	0.87	0.22
plumbeous vireo	*Vireo plumbeus*			0.42	0.42				0.41								0.73	0.75	0.75						0.44	0.42	0.42	
purple finch	*Carpodacus purpureus*			0.34	0.41	0.18	0.46		0.31							0.18	0.44	0.44	0.32			0.30		0.45	1.00	0.30		
purple martin	*Progne subis*	0.33		0.33	0.33		0.26		0.27		0.38		0.33		0.33		0.33	0.31	0.33		0.33	0.33	0.33	0.31	1.00	0.15	0.35	
red crossbill	*Loxia curvirostra*						0.37		0.22									0.11	0.12			0.30		0.33	0.33			
red-breasted nuthatch	*Sitta canadensis*			0.16	0.23		0.52		0.21								0.16	0.28	0.16			0.49		0.58	0.44	0.16	0.16	
red-breasted sapsucker	*Sphyrapicus ruber*			0.50	0.50	0.78	0.65		0.10							0.05	0.60	0.66	0.70			0.61		0.70	1.00	0.46	0.50	
redhead	*Aythya americana*										0.61				0.29								0.12					

Appendix F. Predicted wildlife species occurrence and CWHR average habitat suitibility values by habitat type (continued)

COMMON NAME	SCIENTIFIC NAME	Annual grassland	Barren	Blue oak woodland	Blue oak/ foothill pine	Deciduous orchard	Douglas fir	Dryland grain	Eucaplyptus	Evergreen orchard	Freshwater emergent wetland	Irrigated grain	Irrigated hayfield	Irrigated row & field crop	Lacustrine	Mixed chaparral	Montane hardwood	Montane/ hardwood conifer	Montane riparian	Pasture	Perrenial grassland	Ponderosa Pine	Riverine	Sierran mixed conifer	Urban/ disturbed	Valley/ foothill riparian	Valley oak woodland	Vineyard
Birds																												
red-shouldered hawk	*Buteo lineatus*	0.22		0.63	0.63	0.52			0.45		0.38		0.33				0.41	0.39	0.72		0.22				1.00	0.71	0.63	
red-tailed hawk	*Buteo jamaicensis*	0.55	0.78	0.73	0.72		0.68		0.47		0.42					0.27	0.72	0.71	0.73	0.55	0.44	0.72		0.74	1.00	0.66	0.70	
red-winged blackbird	*Agelaius phoeniceus*	1.88				2.49			0.06		0.50		1.00	1.00					0.17		0.50				0.77	0.45		
ring-billed gull	*Larus delawarensis*	0.39									0.64	0.67	0.07		0.71						0.39		0.62		0.67			
ring-necked duck	*Aythya collaris*										0.89				0.15													
ring-necked pheasant	*Phasianus colochicus*	0.94		0.22		0.48		1.00	0.25	0.48	0.50	1.00	1.00	1.00		0.18					0.94				0.66	0.25		0.66
rock dove	*Columba livia*	0.18				0.22		0.33	0.36			0.33	0.33	0.33							0.18				1.00			0.22
rock wren	*Salpinctes obsoletus*		1.00	0.78	0.78				0.33							0.78	0.78	0.73			0.89					0.04	0.78	
Ross' goose	*Chen rossii*	0.58									0.58	0.67	0.67		0.10						0.58		0.04					
rough-legged hawk	*Buteo lagopus*	0.44	0.44	0.33	0.33				0.20		0.22									0.67	0.44					0.14	0.33	
ruby-crowned kinglet	*Regulus calendula*			0.53	0.65	0.29	0.51		0.21							0.42	0.47	0.70	0.22			0.68		0.78	0.67	0.63	0.49	
ruddy duck	*Oxyura jamaicensis*										0.53				0.32											0.22		
rufous-crowned sparrow	*Aimophila ruficeps*	0.89			0.47				0.17							0.71					0.89					0.12		
sandhill crane	*Grus canadensis*	0.39						0.66			0.83	0.66	0.77	0.55	0.12											0.09		
savannah sparrow	*Passerculus sandwichensis*	0.65		0.16	0.16	0.44		0.22	0.06				0.66			0.07				0.66	0.65					0.06	0.16	0.22
Say's phoebe	*Sayornis saya*	0.55	0.89	0.31	0.33			0.44	0.10				0.67			0.05					0.55					0.06	0.12	
sharp-shinned hawk	*Accipiter striatus*	0.22	0.11	0.49	0.49	0.26	0.54		0.21	0.26		0.11	0.11			0.36	0.74	0.75	0.75		0.22	0.74		0.75	0.89	0.49	0.49	0.55
short-eared owl	*Asio flammeus*	1.00		0.22	0.22		0.11		0.05		1.00	0.78	0.78	0.78		0.14		0.11	0.11		1.00	0.17		0.11	0.67	0.14	0.22	
snow goose	*Chen caerulescens*	0.58									0.67	0.67	0.67	0.67	0.16						0.58		0.10					
snowy egret	*Egretta thula*								0.08		0.78	0.44	0.44	0.44	0.20				0.09				0.20		0.22	0.23		
song sparrow	*Melospiza melodia*	0.12		0.17	0.17	0.15	0.39		0.31		0.78	0.22	0.33		0.03	0.22	0.35	0.33	0.61		0.12	0.23	0.03	0.29	0.66	0.68	0.17	
Sora	*Porzana carolina*										0.83																	
spotted owl	*Strix occidentalis*			0.27			0.37										0.21	0.21	0.33			0.29		0.37		0.25		
spotted sandpiper	*Actitis macularia*	0.08	0.67								0.17				0.49						0.17		0.49			0.12		
spotted towhee	*Pipilo erythrophthalmus*			0.59	0.64	0.15	0.37		0.33							0.64	0.47	0.33	0.33			0.38		0.42	1.00	0.71	0.53	
Stellar's jay	*Cyanocitta stelleri*			0.42	0.43	0.37	0.77		0.30							0.05	0.62	0.79	0.60			0.78		0.77	1.00	0.36	0.42	
Swainson's hawk	*Buteo swansoni*	0.72	0.55	0.34	0.34				0.20							0.07	0.14	0.13		0.77	0.39	0.11			0.77	0.44	0.34	
Swainson's thrush	*Catharus ustulatus*			0.25	0.25	0.29	0.16		0.31							0.15	0.25	0.26	0.58			0.13		0.28	0.44	0.60	0.25	
Thayer's gull	*Larus thayeri*		0.44												0.22													
Townsends's solitaire	*Myadestes townsendi*				0.16				0.22							0.21	0.41		0.21			0.59		0.51				
tree swallow	*Tachycineta bicolor*	0.33		0.48	0.48	0.15			0.29		0.50	0.33	0.33		0.33	0.11	0.48	0.45	0.61		0.33	0.48	0.33		1.00	0.59	0.48	
tricolored blackbird	*Agelaius tricolor*	0.33				0.22		0.33	0.06		0.55	0.33	0.33	0.33							0.19				0.22	0.52		
tundra swan	*Cygnus columbianus*	0.67									0.67	0.67	0.67	0.67	0.19						0.67		0.19					
turkey vulture	*Cathartes aura*	1.00	0.89	0.92	0.92	0.11	0.92	0.44	0.47				0.44		0.12	0.77	0.87	0.86	0.86		1.00	0.87	0.12	0.92	0.55	0.92	0.92	
varied thrush	*Ixoreus naevius*			0.44	0.28		0.71		0.21							0.21	0.29	0.31	0.54			0.30		0.31	0.67	0.47	0.44	
Vaux's swift	*Chaetura vauxi*				0.33	0.11	0.52		0.22		0.11	0.11	0.11	0.11	0.11	0.11	0.27	0.28	0.26		0.11	0.27	0.11	0.44	0.55	0.16		
violet-green swallow	*Tachycineta thalassina*	0.33	0.33	0.67	0.67		0.35	0.22	0.33		0.33	0.22	0.33		0.33	0.11	0.67	0.68	0.68		0.33	0.67	0.33	0.68	1.00	0.67	0.67	0.11
Virginia rail	*Rallus limicola*										0.83								0.06							0.06		
warbling vireo	*Vireo gilvus*			0.83	0.83	0.29	0.46		0.33							0.05	0.70	0.71	0.71			0.43		0.56	0.78	0.83	0.83	
western bluebird	*Sialia mexicana*	0.33		0.52	0.60	0.29	0.27		0.33				0.22			0.09	0.47	0.34	0.34		0.33	0.28		0.27	1.00	0.34	0.44	
western grebe	*Aechmophorus occidentalis*										0.75				0.28								0.16					
western kingbird	*Tyrannus verticalis*	0.33		0.44	0.44	0.40		0.33	0.47		0.11		0.33			0.19	0.46	0.38			0.33	0.10			1.00	0.53	0.44	0.11
western meadowlark	*Sturnella neglecta*	0.75		0.40	0.49		0.39	0.66	0.27			0.66	1.00			0.10	0.32	0.15			0.75	0.16			0.77	0.08	0.40	
western sandpiper	*Calidris mauri*		0.67								0.55	0.67	0.67	0.67	0.19								0.19					
western screech owl	*Otus kennicottii*	0.33		0.83	0.83	0.29	0.24		0.33	0.33		0.33	0.33			0.35	0.78	0.79	0.78		0.33	0.53		0.24	1.00	0.83	0.83	0.33
western scrub jay	*Aphelocoma coerulescens*			0.82	0.82	0.70			0.48							0.59	0.47	0.48	0.44			0.05			1.00	0.76	0.82	
western tananger	*Piranga ludoviciana*			0.42	0.43	0.29	0.42		0.48							0.21	0.45	0.64	0.64			0.65		0.67	0.67	0.42	0.42	
western wood pewee	*Contopus sordidulus*			0.76	0.78	0.56	0.58		0.45							0.28	0.76	0.79	0.79			0.78		0.79	0.66	0.74	0.76	
white-breasted nuthatch	*Sitta carolinensis*			0.72	0.72		0.49		0.27								0.72	0.73	0.73			0.72		0.49	1.00	0.67	0.72	
white-crowned sparrow	*Zonotrichia leucophrys*	0.07		0.34	0.29	0.40	0.20	0.44	0.33				0.44			0.27	0.25	0.13	0.39		0.07	0.10		0.07	0.67	0.35	0.25	0.44
white-faced ibis	*Plegadis chihi*	0.07									0.61	0.33	0.33	0.33	0.15						0.07		0.15					
white-headed woodpecker	*Picoides albolarvatus*						0.23										0.22	0.42	0.23			0.62		0.64				
white-tailed kite	*Elanus caeruleus*	0.33	0.11	0.73	0.73	0.55		0.33	0.62	0.55	0.32	0.55	0.33	0.33		0.32					0.33				1.00	0.53	0.73	0.55
white-throated swift	*Aeronautes saxatalis*	0.30	1.00	1.00	1.00		0.22		0.33		0.11	0.11	0.11	0.11	0.29	0.89	1.00	1.00	1.00		0.22	1.00	0.29	1.00	0.55	0.83	1.00	0.11
wild turkey	*Meleagris gallopavo*	0.83		0.91	0.95			0.22	0.22				0.22			0.19	0.96	0.96	0.78		0.83	0.79		0.55		0.88	0.91	

Appendix F. Predicted wildlife species occurrence and CWHR average habitat suitibility values by habitat type (continued)

COMMON NAME	SCIENTIFIC NAME	Annual grassland	Barren	Blue oak woodland	Blue oak/ foothill pine	Deciduous orchard	Douglas fir	Dryland grain	Eucaplyptus	Evergreen orchard	Freshwater emergent wetland	Irrigated grain	Irrigated hayfield	Irrigated row & field crop	Lacustrine	Mixed chaparral	Montane hardwood	Montane/ hardwood conifer	Montane riparian	Pasture	Perrenial grassland	Ponderosa Pine	Riverine	Sierran mixed conifer	Urban/ disturbed	Valley/ foothill riparian	Valley oak woodland	Vineyard
Birds																												
Williamson's sapsucker	*Sphyrapicus thyroideus*																		0.31			0.26		0.36	1.00			
willow flycatcher	*Empidonax traillii*																		0.55							0.66		
Wilson's warbler	*Wilsonia pusilla*			0.61	0.61		0.48		0.22							0.26	0.43	0.49	0.78			0.22		0.50	0.67	0.91	0.61	
winter wren	*Troglodytes troglodytes*						0.41		0.31									0.49	0.56			0.27		0.39	1.00	0.55		
wood duck	*Aix sponsa*			0.33	0.31		0.11				0.55	0.44			0.27		0.14	0.17	0.26			0.10	0.27	0.11	0.77	0.46	0.33	
wrentit	*Chamaea fasciata*			0.45	0.47		0.23		0.27							0.87	0.23	0.37	0.15			0.17		0.13	0.66	0.23	0.35	
yellow warbler	*Dendroica petechia*			0.59	0.59	0.29	0.16		0.21							0.18	0.28	0.24	0.73			0.68		0.67	0.78	0.77	0.58	
yellow-billed cuckoo	*Coccyzus americanus*					0.26																				0.66		
yellow-billed magpie	*Pica nuttalli*	0.17		0.67	0.67	0.56		0.33	0.72	0.33		0.33	0.33								0.17				1.00	0.43	0.67	0.22
yellow-breasted chat	*Ictervia virens*																		0.11							0.65		
yellow-headed blackbird	*Xanthocephalus xanthocephalu*	0.22									0.75	0.22	0.22		0.03					0.22	0.22							
yellow-rumped warbler	*Dendroica coronata*	0.22		0.60	0.60	0.37	0.86	0.11	0.76		0.11	0.11	0.22	0.22		0.21	0.60	0.85	0.77		0.22	0.85		0.86	0.67	0.60	0.60	0.44
Mammals																												
American badger	*Taxidea taxus*	1.00	0.66	0.18	0.18	0.15	0.06	0.44	0.27	0.15		0.44	0.44	0.44		0.48	0.16	0.24	0.07	0.66	1.00	0.18		0.15		0.08	0.18	0.44
American beaver	*Castor candensis*	0.11		0.28							0.77				0.18			0.09	0.67		0.11		0.18	0.33		0.55	0.28	
American marten	*Martes americana*						0.45											0.44	0.36	0.22	0.22	0.25		0.33				
American mink	*Mustela vison*										1.00				0.16				1.00				0.16			1.00		
Belding's ground squirrel	*Spermophilus beldingi*	0.66	0.33					0.77				0.66	0.66	0.66		0.08		0.09	0.18	0.33	1.00			0.09				
big brown bat	*Eptesicus fuscus*	0.33	0.78	0.99	0.99	0.07	0.62	0.11	0.44	0.07	0.22	0.22	0.22	0.22	0.11	0.66	1.00	0.94	1.00	0.22	0.33	0.66	0.11	0.94	1.00	1.00	0.99	0.22
black bear	*Ursus americanus*	0.33		0.60		0.04	0.59	0.11		0.04		0.11	0.11	0.11	0.10	0.38	0.60	0.61	0.61	0.33	0.33	0.58	0.21	0.59		0.62		0.22
black rat	*Rattus rattus*			0.55	0.55	0.11	0.31	0.44	0.33	0.11		0.44	0.44	0.44											1.00	0.55	0.55	0.33
black-tailed jackrabbit	*Lepus californicus*	0.44		0.41	0.41	0.18	0.26	0.77	0.50	0.18		0.77	0.77	0.77		0.66	0.46	0.36	0.20	0.77	0.40	0.58		0.28	0.33	0.29	0.41	0.77
bobcat	*Felis rufus*	0.44		0.68	0.68	0.04	0.68	0.22	0.33	0.04	0.44	0.22	0.22	0.22		0.77	0.68	0.68	0.68	0.11	0.44	0.68		0.68		0.64	0.68	0.22
Botta's pocket gopher	*Thomomys bottae*	1.00	0.33	0.23	0.23	0.33	0.26	1.00	0.43	0.33		1.00	1.00	1.00		0.23	0.25	0.26	0.28	1.00	1.00	0.33		0.29	0.66	0.25	0.23	1.00
Brazilian free-tailed bat	*Tadarida brasiliensis*	0.22	0.67	0.66	0.66	0.04	0.11	0.11	0.39	0.04	0.11	0.11	0.11	0.11		0.22	0.11	0.11	0.22	0.11	0.22	0.11	0.22	0.33	0.55	0.22	0.66	0.11
broad-footed mole	*Scapanus latimanus*	1.00		0.21	0.21	0.15	0.18	0.66	0.33	0.15		0.66	0.66	0.66			0.21	0.18	0.77	1.00	1.00	0.19		0.18		0.90	0.21	0.66
brush mouse	*Peromyscus boylii*	0.33		0.37	0.37		0.48		0.33							0.97	0.54	0.74	0.66		0.33	0.32		0.40		0.66	0.37	
brush rabbit	*Sylvilagus bachmani*	0.66		0.34	0.46	0.11	0.31	0.66	0.21	0.11		0.66	0.66	0.66		0.79	0.25	0.31	0.30	0.77	0.66	0.24		0.31	1.00	0.39	0.34	0.66
California ground squirrel	*Spermophilus beecheyi*	1.00		0.60	0.58	0.22	0.33	0.77	0.50	0.22		0.77	0.77	0.77		0.43	0.56	0.56	0.42	1.00	1.00	0.51		0.51	1.00	0.50	0.60	0.66
California kngaroo rat	*Dipodomys californicus*	0.92		0.27	0.21	0.11		0.33	0.17	0.11						0.48	0.19										0.27	0.33
California myotis	*Myotis californicus*	0.11	0.67	0.63	0.63	0.07	0.33	0.22	0.44	0.07	0.11	0.22	0.22	0.22	0.11	0.66	0.63	0.60	0.66	0.22	0.11	0.33	0.22	0.63	0.66	0.63	0.63	0.22
California vole	*Microtus californicus*	0.92		0.37	0.10	0.11	0.35	0.77	0.33	0.11	0.50	0.77	0.77	0.55		0.10	0.08	0.28	0.66	0.66	0.92	0.10		0.15	0.66	0.50	0.37	0.33
common muskrat	*Ondatra zibethicus*										1.00				0.21				0.44				0.25			1.00		
common porcupine	*Erethizon dorsatum*			0.27	0.47	0.04	0.57	0.11	0.33	0.04	0.44	0.11	0.11	0.11		0.33	0.30	0.55	0.60		0.22	0.57		0.63		0.62	0.27	0.22
coyote	*Canis latrans*	0.55	0.11	0.66	0.66	0.15	0.64	0.44	0.50	0.15	0.22	0.44	0.44	0.44		0.80	0.66	0.64	0.64	0.66	0.55	0.63		0.64	0.55	0.66	0.66	0.44
deer mouse	*Permyscus maniculatus*	0.66	0.33	0.58	0.58	0.11	0.61	0.66	0.60	0.11	0.66	0.55	0.55	0.55		0.90	0.56	0.83	0.70	0.66	0.33	0.66		0.74	0.66	0.62	0.58	0.44
desert cottontail	*Sylvilagus audubonii*	0.55		0.47	0.53	0.11		0.66	0.50	0.11		0.66	0.66	0.66		0.91				0.77	0.50				1.00	0.45	0.47	0.66
Douglas' squirrel	*Tamiasciurus douglasii*						0.38										0.23	0.38	0.17			0.34		0.38				
dusky-footed woodrat	*Neotoma fuscipes*			0.49	0.66		0.68		0.33							0.82	0.72	0.57	0.57		0.11	0.66		0.63		0.58	0.49	
ermine	*Mustela erminea*						0.58										0.53	0.54	0.54	0.44	0.55	0.53		0.58				
fisher	*Martes pennanti*						0.32											0.32	0.32			0.25		0.32				
fringed myotis	*Myotis thysanodes*	0.11	0.78	0.62	0.62		0.11	0.11	0.33			0.11	0.11	0.11	0.11	0.11	0.22	0.22	0.22	0.11	0.11	0.11	0.11	0.33	0.11	0.28	0.62	
golden-mantled ground squirr	*Spermophilus lateralis*	0.11					0.68									0.67	0.73	0.73	0.55	0.66	0.11	0.73		0.73		0.45		
gray fox	*Urocyon cinereoargentus*	0.30		0.64	0.64	0.07	0.50	0.33	0.50	0.07	0.36	0.33	0.33	0.33		0.68	0.60	0.62	0.24	0.55	0.37	0.43		0.55	0.33	0.41	0.64	0.44
hoary bat	*Lasiurus cinereus*	0.11		0.58	0.58	0.04	0.58	0.11	0.47	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.58	0.58	0.58	0.11	0.11	0.58	0.11	0.58	0.22	0.58	0.58	0.11
house mouse	*Mus musculus*	1.00		0.55	0.55	0.11	0.22	0.77	0.50	0.11	0.50	0.77	0.77	0.77		0.43		0.33		0.66	0.66			0.33	1.00	0.50	0.55	0.66
little brown myotis	*Myotis lucifugus*	0.11	0.67	0.27	0.27		0.27		0.33		0.11				0.22	0.11	0.27	0.27	0.30	0.11	0.11	0.27	0.22	0.41	0.11	0.19	0.27	
long-eared myotis	*Myotis evotis*		0.44	0.66	0.66	0.07	0.78	0.11	0.33	0.07	0.11	0.11	0.11	0.11	0.22	0.22	0.66	0.74	1.00	0.11	0.11	0.80	0.22	0.79		1.00	0.66	0.22
long-legged myotis	*Myotis volans*	0.11	0.67	0.66	0.66	0.04	0.33	0.11	0.33	0.04		0.11	0.11	0.11	0.11	0.11	0.84	0.84	0.94	0.11	0.11	0.84	0.11	0.84	0.11	0.66	0.66	0.11
long-tailed vole	*Microtus longicaudus*	1.00					0.35	0.72			0.66	0.77	0.77	0.66		0.33		0.42	0.68	0.66	1.00	0.49		0.26				
long-tailed weasel	*Mustela frenata*	0.66		0.60	0.60	0.07	0.66	0.44	0.34	0.07		0.44	0.44	0.44		0.59	0.65	0.65	0.66	0.44	0.66	0.65		0.65	0.33	0.65	0.60	0.44
montane vole	*Mictotus montanus*	0.50						0.66			0.33	0.66	0.66	0.44		0.10			0.40	0.66	0.83	0.45		0.33				
mountain lion	*Felis concolor*	0.33		0.52	0.69	0.04	0.64		0.31	0.04						0.69	0.66	0.73	0.74	0.11	0.33	0.73		0.76		0.64	0.52	0.11
mountain pocket gopher	*Thomomys monticola*	0.66				0.33		1.00				1.00	1.00	1.00		0.10		0.18		1.00	1.00	0.23		0.28	0.66			
mule deer	*Odocoileus hemionus*	0.26		0.68	0.67	0.07	0.66	0.22	0.39	0.07	0.22	0.22	0.22	0.22		0.65	0.66	0.65	0.66	0.44	0.26	0.64		0.65	0.44	0.66	0.68	0.22

Appendix F. Predicted wildlife species occurrence and CWHR average habitat suitibility values by habitat type (continued)

COMMON NAME	SCIENTIFIC NAME	Annual grassland	Barren	Blue oak woodland	Blue oak/ foothill pine	Deciduous orchard	Douglas fir	Dryland grain	Eucaplyptus	Evergreen orchard	Freshwater emergent wetland	Irrigated grain	Irrigated hayfield	Irrigated row & field crop	Lacustrine	Mixed chaparral	Montane hardwood	Montane/ hardwood conifer	Montane riparian	Pasture	Perrenial grassland	Ponderosa Pine	Riverine	Sierran mixed conifer	Urban/ disturbed	Valley/ foothill riparian	Valley oak woodland	Vineyard
Mammals																												
northern flying squirre	*Glaucomys sabrinus*			0.37	0.37		0.41										0.23	0.28	0.48			0.33		0.46		0.37	0.37	
northern river otter	*Lutra canadensis*										0.55				0.17				0.50				0.19			0.79		
Norway rat	*Rattus norvegicus*			0.55	0.55	0.11	0.31	0.77	0.33	0.11		0.77	0.44	0.44					0.66	0.66					1.00	0.66	0.55	0.44
pallid bat	*Antrozous pallidus*	0.33	0.67	0.76	0.66	0.04	0.11	0.11	0.39	0.04		0.11	0.11	0.11		0.66	0.11	0.11	0.11	0.33	0.22	0.11	0.11	0.33	0.55	0.22	0.76	0.22
pinyon mouse	*Peromyscus truei*	0.55					0.37		0.33							0.72	0.66	0.66	0.51		0.44	0.55		0.55		0.60		
raccoon	*Procyon lotor*	0.15		0.59	0.59	0.04	0.59	0.22	0.60	0.04	0.32	0.33	0.33	0.33	0.06	0.42	0.58	0.61	0.58	0.22	0.18	0.58	0.05	0.61	0.66	0.50	0.59	0.33
red fox	*Vulpes vulpes*	0.26	0.11			0.33		0.44	0.50	0.11		0.44	0.44	0.44		0.19		0.13	0.21	0.33	0.11	0.14		0.20				0.44
ringtail	*Bassariscus astutus*	0.11	0.22	0.61	0.61		0.57	0.11	0.33			0.11	0.11	0.11		0.72	0.33	0.55	0.55	0.11	0.22	0.33		0.37		0.61	0.61	0.11
silver-haired bat	*Lasionycteris noctivagans*	0.11	0.22	0.48	0.48	0.04	0.58	0.11		0.11		0.11	0.11	0.11	0.11	0.11	0.40	0.51	0.58	0.22	0.11	0.58	0.22	0.65	0.44	0.48	0.48	0.22
striped skunk	*Mephitis mephitis*	0.53		0.58	0.58	0.11	0.53	0.44	0.45	0.11	0.53	0.44	0.44	0.44		0.71	0.58	0.56	0.67	0.55	0.53	0.58		0.56	0.55	0.71	0.58	0.55
Townsend's big-eared bat	*Plecotus townsendii*	0.11	0.44	0.41	0.30	0.04	0.13		0.33	0.04		0.11	0.11	0.11		0.11	0.12	0.12	0.13	0.11	0.11	0.14	0.11	0.35	0.33	0.14	0.41	0.11
Trowbridge's shrew	*Sorex trowbridgii*			0.12	0.19		0.63		0.33							0.23		0.63	0.33			0.60		0.63			0.12	
Virginia opossum	*Didelphis virginiana*	0.33		0.59	0.59	0.11	0.50	0.44	0.66	0.11	0.61	0.44	0.44	0.44		0.50	0.51	0.50	0.64	0.11		0.51		0.33	0.66	1.00	0.59	0.44
water shrew	*Sorex palustris*														0.09			0.09	0.96		0.33		0.13	0.20				
western gray squirrel	*Sciurus griseus*			0.55	0.58	0.04	0.32		0.27	0.04						0.11	0.56	0.58	0.25			0.54		0.36		0.56	0.55	0.33
western harvest mouse	*Riethrodontomys megalotis*	0.92		0.43	0.43	0.22	0.24	0.89	0.33	0.22	0.66	0.89	0.89	0.77		0.51	0.33	0.35	0.70	0.66	0.66	0.37		0.15		0.60	0.43	0.66
western pipistrelle	*Pipistrellus hesperus*	0.22	0.78	0.66	0.66	0.04	0.11	0.11	0.33	0.04		0.11	0.11	0.11		0.22	0.11	0.11	0.11	0.11	0.22	0.11	0.11	0.33	0.22	0.22	0.66	0.11
western red bat	*Lasiurus borealis*	0.22		0.50	0.50		0.51		0.47		0.11				0.11	0.22	0.50	0.51	0.51	0.22	0.11	0.50	0.11	0.51	0.66		0.50	
western small-footed myotis	*Myotis leibii*	0.11	0.67	0.58	0.58	0.04		0.11	0.33	0.04	0.11	0.11	0.11	0.11	0.11	0.22	0.33	0.41	0.44	0.11	0.11	0.41	0.22	0.41	0.89	0.55	0.58	0.11
western spotted skunk	*Spilogale gracilis*	0.44		0.54	0.54	0.04	0.47	0.33	0.33	0.04		0.33	0.33	0.33		0.80	0.54	0.51	0.51	0.22	0.44	0.54		0.51	0.33	0.54	0.54	0.33
wild pig	*Sus scrofa*	0.22		0.63	0.63	0.07	0.13	0.33	0.33	0.07		0.33	0.33	0.33		0.62	0.59	0.38	0.38	0.22	0.22	0.36				0.60	0.63	0.33
Yuma myotis	*Myotis yumanensis*	0.22		0.75	0.53	0.07	0.11	0.11	0.33	0.15	0.12	0.11	0.11	0.11	0.11	0.22	0.22	0.22	0.21	0.22	0.22	0.22	0.22	0.66	0.66	0.33	0.75	0.22

Appendix G

Wildlife Species Observed During Relicensing Studies

Appendix G. Wildlife species observed during relicensing studies

						HABITATS								
			annual		emergent	mixed	blue oak	montane	ponderosa	urban		orchard	row	
SPECIES	lacustrine	riverine	grassland	riparian	wetland	chaparral	foothill pine	hardwood-conifer	pine	residential	rice	vineyard	crops	barren
acorn woodpecker	X			X			X	X	X					X
American avocet	X				X									
American bittern	X	X	X		X									
American coot	X	X	X		X						X			
American crow	X	X	X	X	X		X	X		X	X	X		X
American dipper	X	X												X
American goldfinch			X	X	X									
American kestrel			X	X			X			X	X	X		
American pipit	X		X											
American robin				X	X		X	X		X		X		
American white pelican	X	X					X							
American widgeon	X	X	X	X	X		X				X			
Anna's hummingbird				X			X							
ash-throated flycatcher				X			X	X						
bald eagle	X	X	X	X		X	X	X	X		X			X
band-tailed pigeon							X	X	X					
bank swallow		X		X	X							X		
barn owl		X	X							X				
barn swallow	X	X	X	X	X		X			X				X
Barrow's goldeneye	X													
beaver		X		X	X									
belted kingfisher	X	X		X	X		X	X						X
Bewick's wren				X			X							
black bear		X						X						X
black phoebe	X	X	X	X	X	X	X			X	X	X		X
black tern	X	X			X						X			X
black-chinned hummingbird	X			X	X		X							
black-crowned night heron	X	X		X	X									
black-headed grosbeak				X			X							
black-necked stilt	X				X						X			
black-tailed deer		X	X	X	X		X	X						X
black-tailed jackrabbit			X	X	X		X	X						
bobcat							X							
Botta pocket gopher			X				X	X						
Brewer's blackbird	X	X	X	X	X		X			X	X			
brown-headed cowbird			X	X	X									
bufflehead	X	X		X	X									
bullfrog	X	X		X	X									
Bullock's oriole			X	X	X		X			X				
burrowing owl			X											

Appendix G. Wildlife species observed during relicensing studies

						HABITATS								
			annual		emergent	mixed	blue oak	montane	ponderosa	urban		orchard	row	
SPECIES	lacustrine	riverine	grassland	riparian	wetland	chaparral	foothill pine	hardwood-conifer	pine	residential	rice	vineyard	crops	barren
bushtit				X			X	X						
California ground squirrel			X	X			X	X		X		X		X
California gull	X													X
California newt		X					X							
California quail	X		X	X			X	X						
California slender salamander							X	X						X
California towhee				X			X							
California whiptail			X	X				X						X
Canada goose	X	X	X	X	X			X			X		X	X
canvasback	X													
canyon wren	X	X					X	X						X
Caspian tern	X	X			X									
cattle egret	X	X			X									
cedar waxwings				X			X							
cinnamon teal	X				X						X			
Clark's grebe	X													
cliff swallow	X	X	X	X	X		X			X	X	X		
common garter snake				X										
common goldeneye	X	X			X									
common loon	X													
common merganser	X	X						X						X
common moorhen	X	X		X	X									
common raven	X		X				X	X						
common yellowthroat					X									
Cooper's hawk		X		X			X	X						
cottontail				X										
coyote			X		X		X			X				
dark-eyed junco				X			X	X						
deer mouse			X				X							
double-crested cormorant	X	X		X	X					X	X			
downy woodpecker				X										
dusky-footed woodrat							X							
eared grebe	X													
Empidonax flycatcher				X										
European house sparrow	X	X	X	X			X			X				
European starling	X	X	X	X	X	X	X			X		X		X
ferruginous hawk			X											
Forster's tern	X	X												
fox sparrow								X						
fox squirrel				X										

Appendix G. Wildlife species observed during relicensing studies

						HABITATS								
			annual		emergent	mixed	blue oak	montane	ponderosa	urban		orchard	row	
SPECIES	lacustrine	riverine	grassland	riparian	wetland	chaparral	foothill pine	hardwood-conifer	pine	residential	rice	vineyard	crops	barren
gadwall	X				X		X							
golden eagle	X		X			X	X	X	X					X
golden-crowned sparrow			X	X	X		X			X				
gopher snake			X		X									
gray squirrel	X			X			X	X						
great egret	X	X	X	X	X						X			X
great horned owl			X	X	X									
great-blue heron	X	X	X	X	X		X	X			X			X
greater scaup	X	X			X									
greater yellowlegs	X	X	X	X	X									X
green heron	X	X			X									
hermit thrush							X							
hooded merganser	X													
horned grebe	X													
house finch	X		X	X	X		X			X		X		
house sparrow	X		X				X			X				
house wren				X						X				
killdeer	X	X	X	X	X			X		X				X
lark sparrow	X			X			X							
lazuli bunting				X										
least sandpiper	X													
lesser goldfinch			X	X			X							
lesser scaup	X													
loggerhead shrike			X	X										
long-billed dowitcher	X		X		X									
long-billed marsh wren					X									
mallard	X	X	X	X	X		X				X		X	X
mountain bluebird			X											
mourning dove	X		X	X			X	X		X	X	X	X	
muskrat		X												
northern flicker			X	X	X		X			X				
northern harrier	X		X	X	X						X		X	
northern mockingbird			X	X			X			X	X	X		
northern pintail	X				X						X			
northern rough-winged swallow	X	X		X	X		X							X
northern shoveler	X										X			
Nuttall's woodpecker				X			X							
oak titmouse				X			X	X						
orange-crowned warbler				X			X							
osprey	X	X		X			X	X	X					

Appendix G. Wildlife species observed during relicensing studies

						HABITATS								
			annual		emergent	mixed	blue oak	montane	ponderosa	urban		orchard	row	
SPECIES	lacustrine	riverine	grassland	riparian	wetland	chaparral	foothill pine	hardwood-conifer	pine	residential	rice	vineyard	crops	barren
Pacific chorus frog		X			X		X	X						
peregrine falcon	X					X	X	X	X	X				
phainopepla				X			X							
pied billed grebe	X	X			X									
prairie falcon			X											
purple finch				X										
raccoon	X	X		X	X			X				X		X
racer			X		X									
red-breasted sapsucker				X			X							
redhead	X				X									
red-shouldered hawk			X	X	X		X	X						
red-tailed hawk	X	X	X	X	X	X	X	X			X	X	X	
red-winged blackbird			X	X	X		X				X		X	
ring-billed gull	X	X	X		X		X				X			X
ring-neck pheasant			X	X	X						X	X		
ring-necked duck	X				X									
ring-necked snake								X						
ringtail							X							
rock dove	X	X	X	X						X				X
rock wren	X							X						X
ruby-crowned kinglet				X										
ruddy duck	X				X									
savannah sparrow			X		X									
Say's phoebe			X											
semipalmated sandpiper	X													
sharp-shinned hawk	X			X			X							
sharp-tailed snake							X	X						
short-eared owl					X									
snow goose											X			
snowy egret	X	X		X	X						X			X
southern alligator lizard			X				X							
spotted sandpiper	X	X												X
spotted towhee				X		X	X							
Stellar's jay						X	X	X	X					
striped skunk			X	X				X						
Swainson's hawk				X								X	X	
tree swallow	X	X	X	X	X	X	X	X	X	X				X
tricolored blackbird			X											
tundra swan	X		X		X						X			
turkey vulture	X	X	X	X	X	X	X	X	X	X	X	X		X

Appendix G. Wildlife species observed during relicensing studies

						HABITATS								
			annual		emergent	mixed	blue oak	montane	ponderosa	urban		orchard	row	
SPECIES	lacustrine	riverine	grassland	riparian	wetland	chaparral	foothill pine	hardwood-conifer	pine	residential	rice	vineyard	crops	barren
violet-green swallow	X	X	X	X			X							
Virginia opossum					X		X							
western aquatic garter snake								X						X
western bluebird			X	X			X					X		
western fence lizard			X				X	X						X
western grebe	X													
western kingbird	X	X	X	X	X		X	X		X				
western meadowlark	X		X				X			X				X
western pond turtle	X	X		X										
western scrub jay	X	X	X	X			X	X	X	X		X		
western skink							X	X						
western tananger				X										
western toad								X						
western wood pewee				X										
white-breasted nuthatch				X			X							
white-crowned sparrow			X	X			X			X				
white-faced ibis											X			
white-fronted goose	X										X			X
white-tailed kite	X		X	X	X									
white-throated swift	X									X				
wild turkey				X	X	X	X							
willet	X													
Wilson's warbler				X										
wood duck	X	X		X			X				X			
wrentit				X			X	X						
yellow warbler				X										
yellow-billed magpie			X	X						X		X		
yellow-breasted chat				X										
yellow-headed blackbird					X									
yellow-rumped warbler			X	X	X		X							
TOTAL	93	60	75	103	77	11	89	51	10	32	32	19	7	37